A global initiative to combat desertification

SITE NAME - Soil and water conservation in olive groves - Augeniki- Crete Greece

NOTE: This poster has presented in a previous DESIRE project meeting. The only changes is the expansion of graphs including data until September 2011.

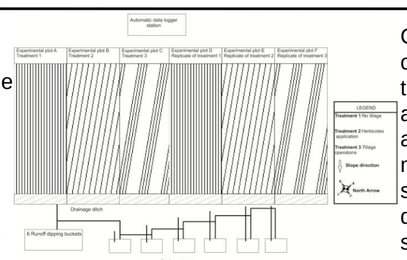
"Executive summary of main findings: The application of the appropriate land management practice can greatly affects land protection and reduction in desertification risk. The measured soil erosion rates under no tillage is almost nil, while under tillage is 3.7 mm/year for the monitoring site.

Introduction

Crete is one of the most important areas of Greece subjected to high desertification risk. Olive groves are widely expanded in the area subjected to various degrees of soil erosion and desertification due to the different applied land management practices. The following three land management practices are the most widely applied: (a) tillage, (b) no tillage, (c) application of herbicides causing various rates of land degradation. The purpose of this study is to analyze the effect of these practices on combating desertification.

Experimental setup

The field experiment includes the following three treatments with two replicas (see map): (a) no tillage – no herbicides application – Technology A, (b) no tillage – herbicides application – Technology B, and (c) tillage operations – Technology C.



Experimental layout

Continuous meteo measurements were conducted by an automatic station. One time measurements were carried out such as: texture and stoniness, organic matter, aggregate stability, etc. Repeated measurements were conducted such as soil moisture with permanent installed time domain reflectometers, soil temperature, sediment loss every rainfall event, surface water runoff every 5 minutes, etc.

Variable	2008	2009	2010	2011
Meteo	←	—	—	→
Moisture	←	—	—	→
Runoff	←	—	—	→
Sediments	←	—	—	→
Organic matter	*			*
Soil penetration		↔		
Aggregate stability	*			*

Results of the biophysical experiments

1 – Technology A

Technology A compared to Technologies B and C shows the following effects:

- Lower surface rain water runoff.
- Nil soil sediment loss (see Fig. 1).
- Higher amount of water stored into the soil (Fig. 2).
- Higher organic matter content in surface horizon.
- Lower soil temperature during the whole year.
- Higher biodiversity.
- Lower desertification risk.
- Lower olive oil cost production.

2 –Technology B

This Technology shows that the following effects compared to technology C:

- Lower surface rain water runoff.
- Intermediate soil sediment loss (Fig. 1)
- Comparable amounts of water stored into the soil. during the whole year (Fig. 2).
- Higher amount of organic matter content.
- Better soil aggregate stability.
- Lower desertification risk.
- Lower olive oil cost production.

3 – Technology C

This Technology had the following effects compared to technologies A and B:

- Higher surface water runoff and sediment loss
- Lower amount of water stored into the soil.
- High soil surface crusting
- Average soil loss 3.7 mm/year due to tillage.
- Lower organic matter in the soil surface
- Higher desertification risk.
- Higher olive oil cost production.

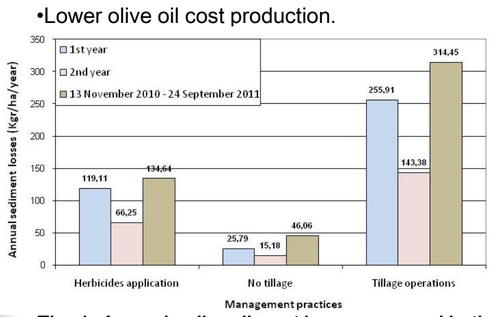


Fig. 1. Annual soil sediment loss measured in the various Technologies

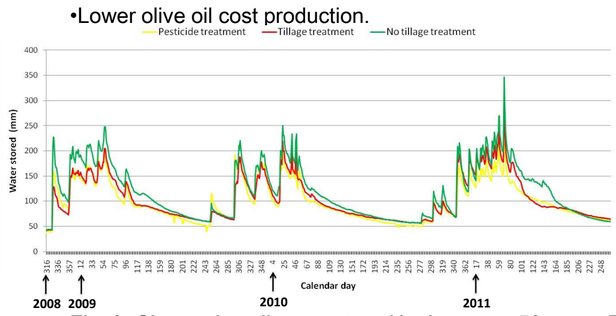


Fig. 2. Change in soil water stored in the upper 50 cm soil layer with time in the various technologies

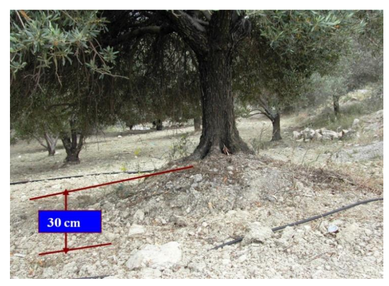
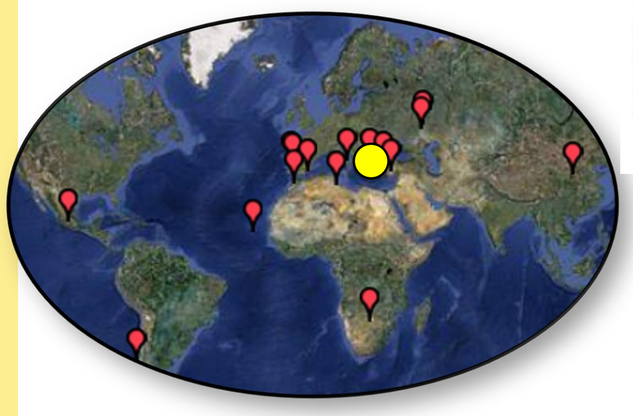


Fig. 3. Change in soil surface due to tillage erosion




← No tillage


← Pesticides


← Tillage

Stakeholder involvement and cost benefit information

Local stakeholder has offered his field for installing instruments and monitoring different land management practices. Many of local farmers have visit the monitoring site and observed the work carried out.. They have considered the applied land management practices and included in the agricultural program of "Integrated Land Management of Olive Groves" for receiving higher subsidies. A 45 minutes documentary has been made and presented in the Greek national television in which the benefits and impacts of both the technologies pointed out.

The benefits are related to: (a) lower cost production of olive oil, (b) higher income due to the application of integrated land management of olive groves for protection of the environment.

The application of no-tillage or minimum tillage land management practices did not require additional cost for implementation.

Several stakeholders have accepted this type of land management practice. The main reaction is the lack of knowledge transfer by the Greek Ministry of Agriculture on new sustainable land management practices and decreasing cost production.

The expectations from the proposed technology in olive groves are: (a) expansion in larger areas, (b) protection of the environment.

Main conclusions and implications for DESIRE as a whole

DESIRE project has a great contribution in providing knowledge on technologies for combating desertification in the following issues:

- ❑ **Organization of knowledge on various effective land management practices existing around the word.**
- ❑ **Providing technologies accompanied with real data on the effectiveness for protecting the physical environment and supporting farmer's income.**

Farmers are greatly convinced for changing land management practices but there is a lack of the appropriate knowledge transfer to land users.

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