

Wooden fences protect against soil erosion

Wooden fences are a cost-effective way of reducing soil erosion and of increasing crop yields in drylands

Desertification is a process that can affect both the ecosystem and the human population very badly in arid and semi-arid regions. It is assumed that majority of the world's population will be influenced directly or indirectly by desertification. As a result, regional *and* global scale social, environmental, political and economic changes are not unexpected.

Studies have indicated that Turkey, due to its geographic position and its socio-economic and landscape peculiarities, will experience accelerating desertification processes in the near future, on top of ongoing ones^{1,2}, due to climate change. The steep topography and the semi-arid climate, mean that soil erosion by run-off water is the most widespread desertification problem. In Central Anatolia, particularly in the Eskişehir province, most of the land is used as pastureland or rainfed cropland. Desertification is increasing here, to a point where mitigation will not be possible. Living standards are poor, giving people here little options to invest in land management. Furthermore people lack the knowledge and know-how.

This brief discusses the options for local farmers of using different technologies in order to reduce soil erosion in Eskişehir province. On the basis of 2 year monitoring, recommendations for decision-makers and land use planners in Eskişehir province are made.

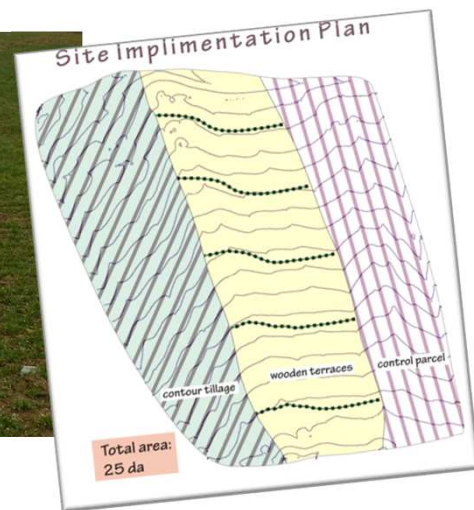


A view across Eskişehir province

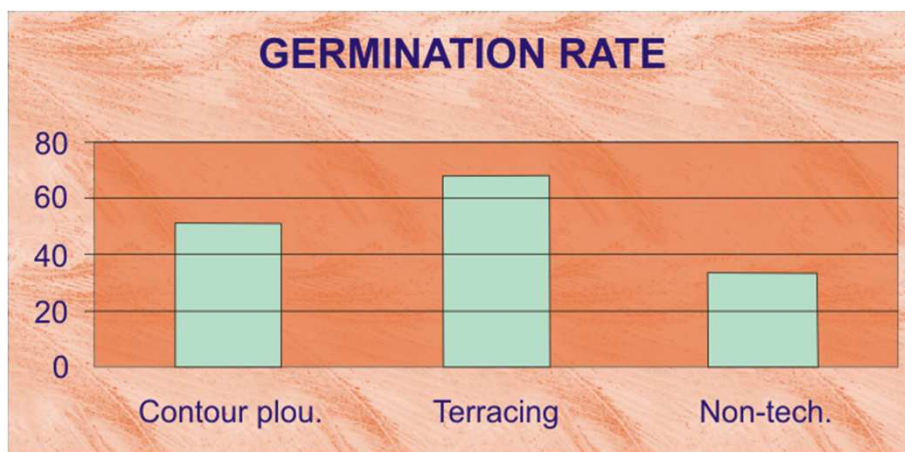
Context and importance of the study

In the DESIRE Project, the Turkish partners (led by Eskişehir Osmangazi University) have studied soil erosion in dry croplands of Anatolia over 5 years. Selected farmers from the Keskin dam watershed (N Eskişehir) and researchers and other experts with different backgrounds have met together and studied land use problems from a physical, social, educational, economic and agricultural viewpoint.

In the early meetings, the farmers considered that soil erosion and insufficient soil moisture were the most serious problems in rainfed croplands. Previous agricultural research had also indicated this. In the later meetings, all stakeholders including farmers, government experts and managers, discussed in detail the drivers and potential solutions for soil erosion in the study site area. The adversely changing climatic conditions were collectively considered to be the basic but irreversible factor. Discussions indicated clearly that the farmers would suffer most from the consequences of soil erosion in the medium and long term, given their current weak economic position. Some agricultural practices that actually tend to increase soil erosion, such as ploughing down a slope rather than across it, have been widely adopted by farmers, sometimes for economic and social reasons and sometimes through ignorance.



Contour tillage and wooden fence terraces were compared with traditional downslope ploughing



Germination rate is one indicator of the success of contour ploughing and wooden fence terracing

Options for reducing soil erosion



Wooden fences

Wooden fences are constructed and the soil piled into terraces behind them, to reduce downslope soil erosion

In the context of the DESIRE Project, stakeholders selected some soil conservation measures that have been successfully applied in other parts of the world. From the possibilities, two technologies were considered promising due to easy applicability and low costs. These technologies have been monitored with respect to soil moisture and crop yield for 2 years. The first technology called “contour ploughing” means that tillage operations should always be carried out perpendicular to the slope. This helps infiltration of water into the soil and reduces surface runoff due to the ridges and furrows that result from ploughing. However, this does require more careful manoeuvring with tractors, meaning more time and fuel is spent, since the fields are mostly elongated downslope. The second technology known as wooden fences consists of a line of stakes inserted into the ground parallel to the contours, with small branches woven in between. A small amount of soil is used to support the stakes and to create a barrier for water flow. Between the fences with their small terraces, contour tillage is carried out.



A view across Eskişehir province

This latter technology introduces additional costs due to fence construction, loss of land under fences and contour tillage, but the costs should be recouped through better crop yields in the future. Both technologies were regarded promising because of their potential to increase soil moisture and decrease erosion.

Results

Although great differences in precipitation occurred during the two monitoring years, both technologies gave good results. In the trial fields soil moisture increased slightly and soil erosion was mostly prevented while rill erosion continued to be common in the control plot that had no measures. Furthermore, crop yield indicators such as plant height, ear length, number of grains in ear, all indicated that wooden fences, and to a lesser extent the contour tillage, helped to increase crop yield.

Cost and income balance of the technologies monitored:

Technology	Income (TL/ha)	Cost (TL/ha)
Wooden fences	630	402
Contour tillage	553	433
<u>Control plot</u>	<u>157</u>	<u>414</u>
Fence cost (TL/ha)		2170

Recommendations

Wooden fences are a sustainable structural technology that increase crop yield and conserve soil. Although a significant increase in income can be achieved by application of woven fences, the initial cost of this technology is usually too high for individual farmer to invest in. For this reason, stakeholders and the DESIRE project experts believe that state-funded subsidies for installing fences and the setup of training courses for the technology are crucial for the technology to be adopted by farmers. The proposed subsidy could be delivered per hectare. In order to determine the exact length of fence/terrace, a pedological study including slope, soil depth and texture should be done by related experts. In this way, the expertise of agricultural engineers and technicians can also be used, while providing them with profitable employment opportunities.

References

¹ DPT, 2000. Report from the Climate Change Specialised Commission, 116 s.

² Türkeş, M., 2002. Climate change: Turkey-Climate Change Framework Relationship and Climate Change Policies, Vizyon 2023.

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The DESIRE project (2007-2012) is funded by the European Commission, VI Framework Program, 'Global Change and Ecosystems' and the governments of France, the Netherlands, Italy and Spain. It brings together the expertise of 26 international research institutes and non-governmental organisations (NGOs). This project is coordinated by ALTERRA – Research Institute for the Green Living Environment, the Netherlands.

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