Geophysical Research Abstracts
Vol. 15, EGU2013-6117, 2013
EGU General Assembly 2013


# Water and soil conservation for food security in Niger and its constraints for adoption

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Nigerien subsistence farmers increasingly rely on marginal degraded lands for food production as a result of ongoing soil degradation, limited fertile land availability and growing population pressure. These degraded lands, however, generally provide poor yields which are largely assigned to an increased vulnerability to drought as a major part of the rainfall is lost through inefficient rain water partitioning. More efficient use of rainwater can be achieved with the aid of water and soil conservation (WSC) techniques such as zaï (Z) and demi-lunes (DL) which positively alter the soil water-balance in favour of productive water and deliver a wide range of ecosystem services.

The results of our in situ root-zone water balance experiment at Sadoré-village (2011-2012) confirm improved agronomical, hydrological and soil quality parameters under the Z and DL treatments. The highest grain yield is produced by the zaï, which is 3 times better than the grain yield of the demi-lunes. Zaï moreover reduce cumulative actual evaporation and both Z and DL increase soil water content in the catchment as measured by a neutron probe and biological soil quality indicated by an extended nematode population of free living species.

The techniques therefore show promising potential to rehabilitate and to increase the agronomic efficiency of marginal land in Niger, but the adoption of the techniques has not been widespread and the dissemination generally encounters difficulties. To identify and quantify the importance and presence of several adoption obstacles in the Tillabéri region, we conducted 100 households surveys exploring farmers' erosion perception, WSC technique knowledge and resource availability.

Although the important adoption triggers such as food insecurity and limited fertile land availability are present, the regions' adoption rate is low due to a general lack of manure availability and a profound knowledge of erosion and the techniques themselves, which indicates the need for an efficient and specialised policy focusing on more than yield alone. Just like every other agricultural undertaking in the Sahel, adoption with economic profit as sole goal contains a significant investment risk for an independent subsistence farmer due to the risk of drought and dry spells, which results even under WSC in low yields. Most farmers have little awareness of erosion causes and effects and therefore do not relate WSC techniques to the indirect benefits for their livelihoods besides higher yield such as re-greening and the prevention of flooding, which are to be taken into account to secure sustainable solutions to drought and food insecurity.