



THE CHALLENGE

To combat Ethiopia's 2010 wheat stripe rust epidemic, a fast-track crop research and rust-resistant seed distribution program not only delivered future protection to the farmers, but also brought higher yields and incomes.

Effective Mechanized Rainwater Harvesting: Coping with climate change implications in the Jordanian *Badia*

Research on micro-catchment rainwater harvesting techniques by ICARDA and Jordanian scientists has led to the establishment of semicircular bunds on contour ridges and furrows (using GPS laser-guided Vallerani machine) and runoff strips in two communities of Jordan Badia. As an outcome of this research, an effective micro-catchment laser-guided system was identified for rainfall harvesting, which has led to improved water availability, increased vegetative cover and improved soil health, and provided rural communities substantial sources of feed for sheep and goats.

Technologies for improved rainwater management in Jordan

In a project on Community-Based Optimization of the Management of Scarce Water Resources in Agriculture in West Asia and North Africa, which started in 2004 with funding support from Arab Fund for Economic and Social Development (AFESD), International Fund for Agricultural Development (IFAD) and OPEC Fund for International Development (OFID), ICARDA established several benchmark research sites in different agroecosystems including Jordan Badia for the implementation of integrated watershed management approach. GIS-based land suitability

analysis was performed to integrate biophysical and socioeconomic factors into a comprehensive site characterization map.

In the two communities of Mharib and AlMajidyia micro-catchment water harvesting techniques, like contour ridges and furrows, runoff strips and bunds were designed and established. Vallerani machine, a plow with a hydraulic arm for intermittent pit excavation along the natural contour of the slope, was used for excavating furrows. Scientific research led to a low-cost Contour Laser Guiding (CLG) system, based on GPS guidance technology, which was adapted and implemented to the Vallerani unit.

For the sustainability of the project, communities were actively engaged and they agreed not to graze the newly planted shrub for at least two years after planting, a time needed for the establishment of drought tolerant *Atriplex* species as a source of fodder shrubs. This system reduced the pressure on rangelands and also provided sources of nutritious feed from the drought tolerant *Atriplex* species.

Technologies for improved rainwater management in Jordan

The integrated approach that was used in the Badia recovery to sustain plant cover and conserve soil from degradation has resulted in community resilience to harsh environment and to the severe effects of climate change. The use of mechanized Vallerani system has allowed the implementation of rainwater harvesting package at a large scale. The main beneficiaries are the herders and rural communities of marginal lands where sheep and goats are the main source of income for better livelihoods. This system has enabled them to grow fodder shrubs and reduce pressure on rangelands for livestock grazing in areas where rainwater is not enough to support stable and sustainable production and better livelihoods.

Beneficiary farmers are enjoying more than double the yield for barley and 1.6 times for rangeland and forage shrubs production compared to those grown without rainwater harvesting. Highly degraded lands have been rehabilitated by this improved vegetation, thus mitigating land degradation. The GPS-guided micro-catchment rainfall system has reduced cost and time required to delineate contours for the plow to follow, and tripled the construction capacity (up to 30 ha/day), improved efficiency and precision, and substantially reduced the cost of establishing micro-catchments.

In partnership with Jordan's National Center for Agricultural Research and Extension, USDA-Agricultural Research Service, Texas A&M University, Jordanian Ministry of Agriculture, and University of Jordan, another project on Water and Livelihood Initiative, funded by the United States Agency for International Development, focused on improving



Atriplex halimus shrubs receiving large amount of harvested rainwater in the mechanized Vallerani bunds

livelihoods of participating rural communities and reducing land degradation at pilot sites using the Vallerani rainwater harvesting package. Under the Badia Restoration Program, Jordan's Ministry of Environment has purchased three new Vallerani machines for the rehabilitation of rangelands in the Badia region. It has substantially facilitated wide dissemination of this technology.

In Jordan, the Vallerani rainwater harvesting package developed through scientific research has been implemented on over 3864 ha of rangeland so far, with adoption rates tripling since the start of the project. Biodiversity has increased by capturing 67-73% of available seeds in the harvested area compared to 3-6% in the control sites. Around 40-50% of precipitation is prevented from being lost by evaporation at the intervention sites.