

# Summary of Accomplishments by New Mexico State University, IALC Project, USAID, Jordan

## Rangeland Restoration

### *Research*

A study conducted in collaboration with BRDC at Tal Rimah during 2004 through 2009 demonstrated that the combination of shrub plantings, water harvesting techniques (contour furrows, micro-catchments, and low rock walls) and proper grazing management practices may have the potential for increasing the range carrying capacity by three to six fold as compared to non improved rangeland under present management practices. This demonstration used relatively high cost construction alternatives for building the water catchments and planted comparatively expensive shrubs. Even under these conditions the concept appears to be economically feasibility with investment payback period ranging from 4 to 17 years depending up assumptions of the sustainable level of grazing and average rainfall.

A second study conducted by BRDC, NMSU and USDA-ARS was conducted in Qurain and Tal Rimah to evaluate the potential for forage kochia (*Kochia prostrata*) and perennial grasses for rangeland restoration in the Badia. Forage kochia appears to be an excellent forage resource for restoring perennial vegetation in arid rangelands of Jordan. Forage kochia emerged and survived the summer in drought conditions (70 to 110 mm of annual precipitation). However, in conditions where annual precipitation is less than 70 mm, forage kochia may not survive.

Forage kochia can be broadcast seeded with minimal soil preparation, which will dramatically reduce restoration costs compared to transplanting nursery raised stock. Many of Jordanian rangelands are remote, and operation of machinery can be difficult because of rugged terrain or large rocks on the soil surface. The Sahro-select and Otavny-select varieties performed better than the other forage kochia varieties in the drought conditions of 2008 and 2009. However, at present, these varieties have not been released as commercially available cultivars. The commercially available Immigrant variety also performed reasonably well.

Perennial grass varieties evaluated in this study originated from Eurasia and were selected for arid and semi-arid conditions in the western United States. These grass varieties also have potential to be used in reseeding Jordanian rangelands, especially in areas receiving more than 100 mm of precipitation. The Kazak and Vavilov Siberian wheatgrass varieties may be slightly more productive than Hycrest crested wheatgrass and Bozoisky Russian wildrye in the arid conditions of Jordan.

A third study was conducted to determine if water harvesting and limited tillage was needed to establish forage kochia (Immigrant variety) and perennial grasses (Siberian

wheatgrass and crested wheatgrass). Simple broadcast seeding with no soil tillage did not result in successful seedling establishment of forage kochia or perennial grasses. However, seeding with minimal soil disturbance and only light raking was successful. Water harvesting may not be economical in drought conditions when there is no surface water runoff. Contour plowing did not improve seedling establishment during a drought year.

### **Outreach**

Two workshops were conducted to train local livestock producers on the value of rangeland restoration and low-input methods for establishing perennial forage. One workshop was conducted at Tal Rimah (40 participants) and the second in Qurain (30 participants).

Two presentations of the research conducted at Tal Rimah and Qurain were presented at the International Farm Managers Association conference in Bloomington, Illinois (July 2009) and the Society for Range Management (February 2010).

A manuscript summarizing the evaluation for the forage kochia and perennial grass varieties in Jordan will be submitted to *Rangeland Ecology and Management* (an international peer-reviewed scientific journal). The title of the paper is: "Potential of *Kochia Prostrata* and Perennial Grasses for Rangeland Rehabilitation in Jordan."

In July 2009, Sheikh Hussein from Qurain, Jordan and Ahmad Al-Qadi (BRDC) visited NMSU in Las Cruces for training in grazing management, livestock husbandry and women's issues.



Rangeland restoration activities of New Mexico State University and BRDC in Jordan: Evaluation of seeding and water harvesting practices in Qurain.



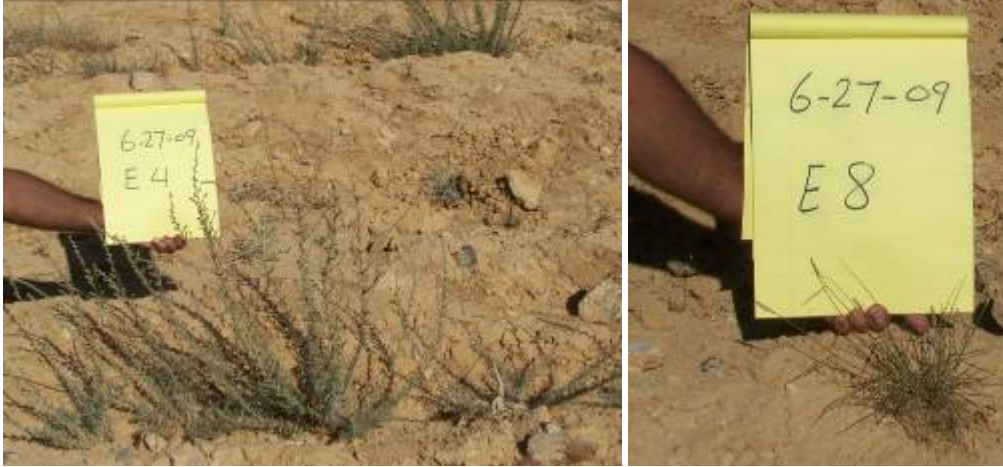
Community involvement of rangeland research restoration research and demonstration with NMSU and BRDC.



Tour of Qurain cooperative research NMSU and BRDC rangeland restoration site by Prince Husan.



Tent for field day presentations and participants examining rangeland.



Very promising varieties of forage kochia (*Kochia prostrata*) and Siberian wheatgrass (*Agropyron fragile*). Two year's growth from seed with less than 100 mm of annual precipitation.



## Summary of NMSU Rangeland Restoration Activities in Jordan

Item	Description of Activity	Factors	Number of People		Measure	Remark
			Direct	Indirect		
1	Shrub planting demonstration at Tal Rimah (BRDC & NMSU)	Environmental, Economic, Community	70	500	Improve rangeland productivity by 3 to 6 fold	2004 through 2009
2	Economic analyses of Tal Rimah shrub planting demonstration (NMSU & BRDC)	Environmental, Economic Livestock	10	500	Payback period for rangeland restoration from transplanting shrubs is 4 to 17 years	2006 through 2007
3	Rangeland restoration workshop (BRDC & NMSU)	Environmental, Economic, Community	40	80	Conduct workshop explaining economic returns from planting shrubs on rangeland	December 2007
4	Grazing behavior research study (BRDC)	Environmental, Livestock	10	50	Conduct grazing behavior study	2006 through 2007
5	Germplasm – forage kochia and grass variety evaluation study (USDA-ARS, NMSU, BRDC)	Environmental, Livestock	20	500	Identify adapted and palatable forage species for reseeding rangelands in Jordan	2007 through 2009
6	Seeding and water harvesting practices evaluation (NMSU, BRDC, USDA-ARS)	Environmental, Economic, Livestock	20	300	Determine extent of tillage and or water harvesting practices needed for seed establishment	2008 through 2009
7	Use of forage kochia and perennial grasses for rangeland restoration with minimal tillage (BRDC, NMSU)	Environmental, Economic, Livestock, Community	30	100	Train livestock producers how to use forage kochia and Siberian wheatgrass for rangeland restoration. 1 day workshop.	June 2009
8	Grazing management, livestock husbandry, and women's issues (NMSU, BRDC)	Environmental, Economic, Livestock, Social, and Health	2	100	Training for Sheikh Hussein and BRDC technician during visit to NMSU	July 2009
9	Rangeland restoration practices evaluation (NMSU, BRDC)	Environmental, Economic	30	100	Scientific presentation at International Farm Managers Association conference in Bloomington, Illinois	July 2009
10	Evaluation of forage kochia and grass varieties (NMSU, BRDC, USDA-ARS)	Environmental	5	500	Manuscript submitted to international scientific journal, Rangeland Ecology and Management	December 2009
11	Use of forage kochia and perennial grasses for rangeland restoration with minimal tillage (NMSU, BRDC, USDA-ARS)	Environmental, Livestock, Economic	5	100	Scientific presentation at the Society for Range management meetings (international rangeland management society)	February 2010

## **Business and Socioeconomic Analysis of Water Use by Farmers**

### ***Water Use Surveys***

The surveys of water use by 150 farmers in the South Jordan Disi aquifer and 105 farmers in the North Mafraq basin showed that:

1. On average, farmers used significantly more water than what was agronomically recommended for the crops grown.
2. Farmers living on the lands they farmed tended to use less water and obtained almost twice the yields per unit of water than owners living off-farm.
3. The vast majority of farmers don't use outside experts to assist in efficient water use.
4. Installation of meters to measure water use, charging a fee based on the amount of water used, education on crop water needs would reduce the amount of water used in agriculture and slow the depletion of aquifers without negatively impacting total production.

## **Assessments of Community Based Projects in the Badia Region**

### ***Community Based Agricultural Projects***

Financial analysis of the agricultural enterprises on the Anaqeed Cooperative indicated that the production of honey, sheep, and sundried tomatoes had the potential of being profitable enterprises assuming good management and more effective marketing. The non-agricultural enterprise of concrete block manufacturing shows promise of being profitable. Feasibility analysis was not done for the crop and livestock enterprises prior to beginning production and the cash based government accounting system being used was not adequate to properly measure profitability.

The financial analysis of the Tal-Rimah sheep milk cheese processing plant, which was performed after the second year of operations, showed that there was no viable strategy for making the factory a long-term economically viable enterprise. The plant was built with funds from the government without the benefit of a detailed feasibility assessment. Had a feasibility assessment been required, it is likely the plant would not have been built.

The financial analyses of the Anaqeed and Tal-Rimah are situations often seen where well intended government funding is made available for projects to create much needed income and employment opportunities for Bedouins in the Badia region. However, neither of these projects had a competitive advantage in the market place to be self sustaining projects – projects that

had a reasonable probably of continuing operations without substantial infusing of government funds annually. Hopefully more government agencies, non-profit donor agencies, community leaders will recognize the need to perform a feasibility analysis and prepare a business plan prior to investing social and private capital into future projects.



NMSU & BRDC assessed the financial performance of the agricultural business ventures of the Anaqeed Cooperative



NMSU & BRDC assessed the financial performance of the sheep milk cheese processing plant at the Tal-Rimah Cooperative





Financial performance seminar for members of Anaqeed and Tal-Rimah cooperatives



NMSU & BRDC assessed the feasibility of block manufacturing at the Anaqeed Cooperative



Seminar at Al Al-Bayt University on financial results of feasibility studies of Anaqeed and Tal-Rimah projects



Sweet onion trials on Sheikh Khalid farms in Al Mudawwara

### ***Fiber Arts Feasibility and Training Project***

In late 2006, the NMSU economics team began to explore the feasibility of a financially self-sustaining community based project in the Badia that would produce high quality woven wool products from native sheep for sale primarily on the Internet and in international markets. The project would utilize two abundant resources in the Badia; wool from their native sheep and labor provided by women in need of income opportunities. This effort would build on the currently well established craft industries but would focus on a niche international market for everyday useful high quality premium handmade products using native wool, historical designs, and some natural dyes. The products would be produced under conditions that would allow the use of “Fair Trade” labels.

Several cooperatives or associations involved in the production of crafts were visited in 2008. The Jordanian Women’s Qualifying and Training Society in Udreh was selected as an attractive site for a pilot project. This society’s members were receiving training in weaving rugs using a



simple floor loom, training in sewing of clothing and related items, had a well equipped sewing room with a large number of machines and possessed a larger number of women interested in such a venture.

Their labor practices were very time consuming because of inadequate equipment and training. To effectively create a product that could be competitive in the designated niche market, spinning wheels, drum carders, weaving looms and other tools were purchased and delivered to the Society in June of 2009.



Training conducted at the Jordanian Women's Qualifying and Training Society in Udreh

In July of 2009, Kimberly Shifflett, a highly experience commercial artist with over 20 years of experience in fiber crafts, conducted a several day preliminary orientation and training session for 19 women. The women were very interested and eager to learn. However, considerably more training and experience is needed before they are ready to produce high quality premium products for the international market. A demonstrating was conducted on dying their native wool using solar drying techniques as opposed to using expensive propane fuel.

A feasibility assessment was completed in the fall of 2009. The assessment indicated that it was possible to development a financially self sufficient fiber arts business along the ideas discussed

above but it would require government upfront funds for startup expenses, the purchase of additional equipment, substantial additional training in spinning weaving, sewing and business practices, development of a brand name, additional products and designs and developing the international market distribution net work.

The NMSU team believes a fiber arts company can be successful and create a large number jobs for women and provide a higher value use for their native wool and is worthy of further development.



Representative products that might be produced by Jordanian fiber artists

Item	Description of Activity	Factors	Number of People		Measure	Remark
			Direct	Indirect		
1	Seminars on developing marketing plans and feasibility studies to BRDC staff	Improved economic performance	11	300	Trained BRDC staff to assist Bedouin to make better economic decisions on resource use	May 2006
2	Economic analysis of Anaqeed Al-Khair Cooperative agricultural activities	Economic, marketing, employment, crops ,livestock	170	1,259 households	Identify which crops and livestock activities were financially sustainable	2006 through 2007
3	Economic analysis of Tal-Rimah sheep cheese factory	Economic, marketing, Community	40	2,784 persons or 460 households	Feasibility analysis of the factory as currently operated and suggest way to improve financial performance	2006 through 2007
4	Agricultural water use survey of 105 farmers in the North Jordan aquifer	Water use , water conservation environment, economic	105	Several thousand in Amman	Information for water conservation policies including water pricing and future use in Amman	2006 through 2007
5	Agricultural water use survey of 150 farmers in the South Disi basin	Water use , water conservation environment, economic	150	More than 1,000	Information for conservation policies including water pricing and future urban and industrial uses	2006 through 2008
6	One week seminar on understanding accrual accounting and feasibility studies for BRDC staff in NM	Economic, marketing, financial analysis, community development	2	300	Trained BRDC staff to perform feasibility studies on projects before investing funds to avoid projects that will not be sustainable	September 2006
7	Presented seminar to members of Anaqeed and Tal-Rimah cooperatives on their financial performance	Economics, community development, effective use of resources	11	210	Demonstrated which agricultural enterprises were or could be profitable with better management and which were not sustainable	July 2007
8	Development of a sweet onion enterprise on Sheikh Khalid farms in Al Mudawwara	Economics, Marketing, economic development	5	50	Assistance given on seed selection, planting and harvest dates, cultural practices and marketing	2007 through 2009
9	One week seminar with BRDC staff how to conduct feasibility studies in New Mexico	Economics, effective use of financial resources	1	50	Trained BRDC staff to perform feasibility studies on projects before investing funds in non projects	December 2007
10	Seminar at Al Al-Bayt University on financial results of feasibility studies of Anaqeed and Tal-Rimah projects	Economics, sustainable use of financial resources, marketing	35	350	Discussion to demonstrate that feasibility studies including marketing plans need to be done before investing in projects	June 2008
11	Preformed financial analysis of concrete block manufacturing , Anaqeed Cooperative	Financial feasibility, community development	170	8,000	The financial analysis results indicated that the concrete block enterprise can be profitable and provide jobs	2009
12	Research on the feasibility of a fiber arts industry that would provide jobs to women	Economic development, jobs creation use of local resources	40	120	Research indicated that a self-sustaining business is possible using native wool for products sold internationally	2008 through 2009
13	Conducted training session for women on spinning and weaving, Women's Training Society in Udah	Job creation, income for women use of local wool resources	19	60	Trained women on how to use spinning wheels looms, carding machines, dyeing wool and local designs	July 2009

## **NMSU publications from the IALC project, USAID Jordan Series**

Report # 1: Profitability Assessment of the Enterprises of the Anaqeed Cooperative Community-Based Project, Badia Region, Jordan, March 2007

Report # 2: Profitability Assessment of the Tal-Rimah Dairy Processing Factory Badia Region, Jordan, March 2007

Report # 3: Profitability of Anaqeed Cooperative Enterprises (FY07) and the Financial Feasibility a Concrete Block Enterprise, Badia Region, Jordan, June 2008

Report # 4: Tal Rimah Range Rehabilitation – Recreating a Valuable Resource, June 2008

Report # 5: Fall Planted Onions on a Bedouin Farm in Al-Mudawara, Jordan Applied Economic Development, July 2008

Report # 6: Water Management in the Disi Basin in Jordan, July 2008

Report # 7: Factors Affecting Agriculture Water Use in the Mafraq Basin of Jordan: Quantitative Analyses and Policy Implications, September 2008

Report # 8: Potential of Kochia Prostrata and Perennial Grasses for Rangeland Rehabilitation in Jordan, December 2009

Report # 9: Feasibility Assessment of Job Creation for Jordanian Women in Fiber Art Crafts, December 2009