High and Low-tech innovations to enhance resilience of small-scale farmers

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0 – VIRTUAL MEETING OF DRYLANDS EXPERTS
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Introduction

**Drylands Context:** characterized by land use systems across the desert, arid, semi-arid and dry sub-humid agro-ecologies.

- Communities living in these “difficult” environments have developed resilient farming systems comprising *inter alia*:
  - Use of grasslands that support almost half of livestock globally;
  - niche crop/commodity production systems;
  - forestry/agroforestry – to sustain highly adapted livelihood systems.

- Dryland agriculture constitutes >44% of *global agricultural production* and contains significant agro-bio-diversity. And drylands *contribute to 50% of the livestock production*, globally.

- Some 33 % of the *global human population and 50%* of a range of livestock production systems including Pastoralists.
Challenges for Dryland farming systems:

- Plant and animal health - crucial for the production of food for human consumption.
- Plant pests and diseases are important threats also to dryland farming community-livelihoods especially in developing countries where agriculture (including livestock) is the main source of income.
- A very high proportion of agriculture production is lost annually due to destructive pests and diseases – (the latest Desert locust plague).
- The effects of Zoonotic diseases - the COVID19 Pandemic and the new normal
The COVID 19 Pandemic - impacting on Food Systems

The negative effects of the Pandemic are not confined to the drylands:

- **Supply Chain disruptions** due to restricted trade flows in food systems with high dependency on imports (for equipment such as for cooling meats, for inputs such as feed, or for food products themselves – import or export dependencies).

- **Post harvest food processing** is interrupted or in dis-array due to labour movement restrictions, increased risk for spreading diseases at the facilities or via products leaving from them;

- **Market failure** - for small retail operators and those heavily dependent in supplying them, due to severe movement restrictions of consumers - lack of e-commerce linkages (market diversification)

- The challenge for the coming cropping seasons – a downward spiral:

  - **Lack of or insufficient number of workers** for cultivation and agricultural production - may negatively affect timing of planting and subsequent harvests, similarly for food processing  
    (Source FAO)
Overcoming Challenges & Opportunities

- **Traditional sustainable resource management** systems are breaking down: demographic pressures; climate change etc.

- **Capacity building of Weak institutions**: lack of agricultural advisory services and so, poor access to knowledge of cutting-edge technologies & new practices/techniques for marginal farmers (with no decision tools).

- **Sustainability of agricultural production systems** = highly judicious use of resources: knowledge-intensive use of biomass; soil fertility management, efficient water use technologies, and context-appropriate production and protection measures.

- **Agriculture in the drylands can thrive through**: Innovative cultivation methods and novel technologies, Modern smart irrigation technologies, Soil fertility management, Improved dryland food and feed crop varieties

A holistic approach to Food Systems for sustainable production in drylands in order to deliver on SDG 1 & 2 with links to the entire 2030 Agenda.
What can we learn from IFAD’s grant portfolio?

Target groups

- The Fund’s target groups and their household food-security strategies predominantly located in harsh, marginalised agro-ecologies;

Tailored Investments

- Over the past four decades IFAD has invested more than USD 2 billion in the development of best-bet technologies with particular reference to those in remote, risk-prone and marginal areas and the above-mentioned target groups.
Some successful Low-tech Options

- On-farm Feed Production
- Barley Production
- By-products Feed Blocks
- Cactus & Fodder Shrubs
- Small Ruminant Husbandry & Management
- Agroforestry; Natural Pastures Enhancement & Rangeland Management
Alternatives for Smallholder Irrigation

Community Level Tools for decision making and implementation should include:

- sustainable, healthy, and ecologically sound management of smallholder irrigation
- Smallholders using manpower or pumps
- Small multi-purpose reservoirs
- Larger government sponsored smallholder schemes
Atriplex/barley alley cropping
Transformed Agricultural landscapes

Five million hectares of millet production in Faidherbia parklands in Niger: A transformed agricultural landscape

Aerial view of a parkland dominated by Faidherbia in Niger
Adoption of high impact Forage Legumes

- Promotion of rotations of barley with forage legumes (Vicia and Lathyus spp.)
- Improved breeds of small ruminants – better adaptability and more efficient feed conversion
Example of sheep Feeding on Barley Stubble
Innovations in breeding

Efficient feed conversion

EARLY WEANING
Adapting Spineless Cactus; but also Halophytes for Biosaline Agriculture
Protection technologies in desert conditions with net-houses

- With IFAD and AFESD support ICARDA and NARS have developed net houses throughout the Arabian Peninsula since 2008 (Arabian Peninsula Regional Programme).

- Soil-less agriculture (Hydroponics) in UAE.

- Protected agriculture is very promising (e.g, Afghanistan, Yemen): Net-houses allow vegetable production in desert conditions 8-9 months of the year with high yield. Net benefits same as cooled greenhouses in 12 months due to energy savings.
Technologies for storable, transportable feed

IFAD-supported ICARDA Research – development and scale-up of feed-blocks
The promise of new technologies for sustainable food systems in the drylands

Fourth industrial revolution technologies – examples:

- **Precision agriculture using AI**
- **Remote sensing (satellite imagery & ground truthing)**
- **Drones for better mapping soil structure**
- **"Good" biotechnologies - molecular markers (breeding efficiency)**
- **Gene-editing techniques**

*And much more......*
Improving Resilience in the Drylands – Towards a food systems approach

• Overcoming new constraints to Food systems –
• The need to place new technologies within their appropriate operational context (adoptability)
• Need to look beyond the farm - rural systems-urban links;
• Input- and Output-Markets
• Removing disruptions and improving access –
  - the role of Labour markets and value-chains;
• an enabling institutional and policy context;
• And Big Data (also for evidence-based policies)..

• And more.....
Thank you!
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