

Business models for small-scale mechanization of animal feed to improve farmers' incomes, soil conservation and climate change adaptation/mitigation



Boubaker Dhehibi (RALSP-ICARDA)
Aymen Frija (RALSP-ICARDA)
Udo Rudiger (RALSP-ICARDA)
Amal Mannai (Dr-ICARDA)

B.Dhehibi@cgiar.org

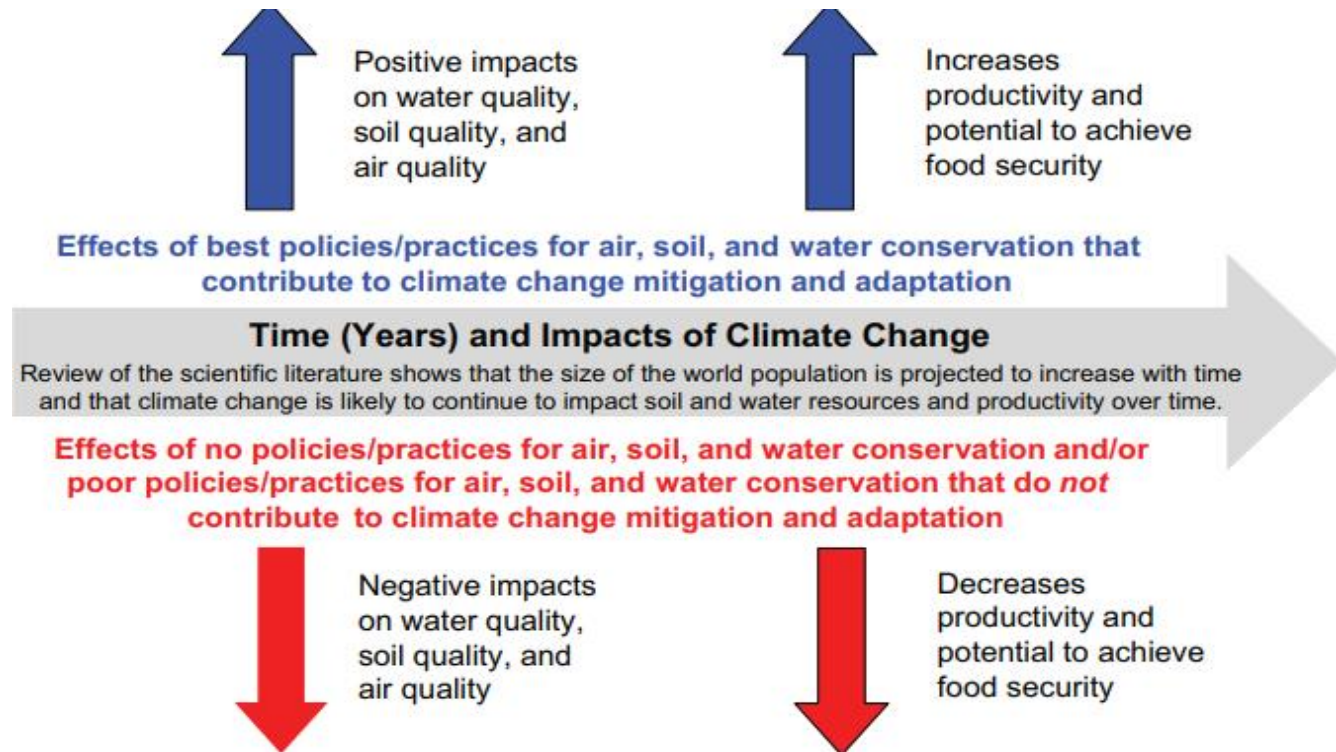
A.Frija@cgiar.org

U.Rudiger@cgiar.org

mannaiamal.dr@gmail.com

Practices to Mitigate and Adapt to Climate Change in Tunisia

- Conceptual Framework



Source: Jorge A. Delgado, Peter M. Groffman, Mark A. Nearing, Tom Goddard, Don Reicosky, Rattan Lal, Newell R. Kitchen, Charles W. Rice, Dan Towery and Paul Salon Journal of Soil and Water Conservation July 2011, 66 (4) 118A-129A; DOI: <https://doi.org/10.2489/jswc.66.4.118A>

Practices to Mitigate and Adapt to Climate Change in Tunisia

- **Hypothesis**

- There is a causal relationship between climate change, water and soil resources, population growth, and food security.
- Climate change is impacting soil and water resources and is threatening agricultural production.
- Good soil and water practices can contribute to climate change mitigation and adaptation.
- Poor soil and water practices will contribute to negative impact on agricultural productivity.

Practices to Mitigate and Adapt to Climate Change in Tunisia

Which Climate Smart Practices for the project

- Conservation agriculture, and no-tillage seeding.
- Appropriate forage species and forage mixture adapted to contexts in both cereal and olive-based farming systems.
- Integration of legumes and cereal-legume mixtures in the cereal mono-cropping rotation.
- Integrated improved crop management systems to enhance WUE, soil fertility and reduction of erosion, especially under rainfed agriculture.

Mitigation and Adaptation actions from SWC@Scale (PROSOL) practices

Mitigation Strategies for Agriculture Production

- Increasing soil C sequestration to improve soil functions.
- Increasing the efficient use of N for mixed cropping systems.
- Capturing nutrients and energy from crop residue, and cover crop management.

Adaptation Facts for Climate Change

- Erosion prevention and protection.
- More diverse cropping systems to adapt to variable climates and new pest and disease pressures.
- Managing soil and crops to increase water use efficiencies.
- Developing new crop-forage varieties that are drought-tolerant and more resistant to heat-stress.

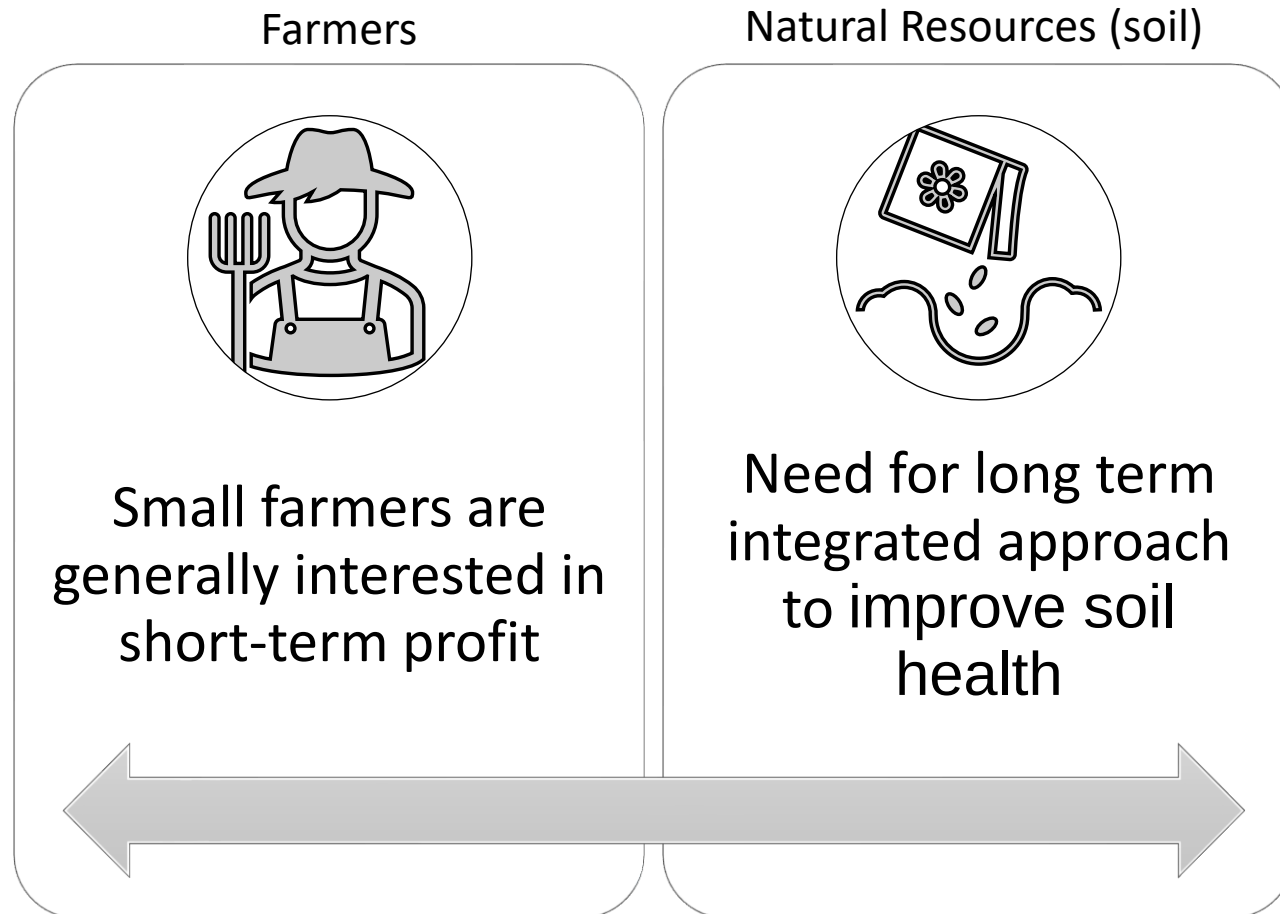
Mitigation and Adaptation actions from SWC@Scale (PROSOL) practices

- SWC@Scale (PROSOL) practices are beneficial to mitigate and adapt to climate change in arid areas.
- Farmer management adaptations and use of conservation practices to adapt to a changing climate have the potential to greatly reduce soil erosion rates.
- Conservation practices will be key and must be used as strategies for adaptation to climate change impacts on the soil resource.
- Helping farmers adopting these practices can also significantly improve their capacities to climate change adaptation and mitigation.



Introduction

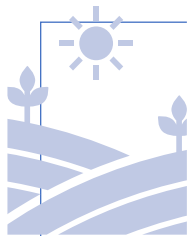
Why Small Machinery in a Soil Conservation Project?



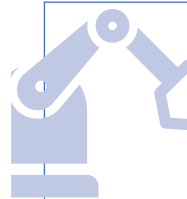
Introduction

Why Small Machinery in a Soil Conservation Project?

Small machines in mixed crop-livestock systems help to “boost” adoption and to accept certain soil conservation innovations/practices such as:



Rotations with fodder can be kept in the form of pellets thanks to a small pelleting machine.



Crops like cactus, which can be chopped with a feed grinder and mixed to produce a low-cost mix for animal feed.



Better availability of seeds of fodder crops which improve the quality of the soil, thanks to mobile seed cleaning & treatment machines.



Objective

How to use machines to complement other soil relevant innovations and practices !!

Motorized chopper / Feed grinder

- Support local manufacturers of **motorized and mobile feed grinders (220V/380V/ tractors - PTO)**

Capacity: 1-10t/day

Cost: TND 3.300

- Chopping and grinding of barley, straw, hay, etc.
 - Better digestion and absorption of nutrients.
- Grinding of organic matter (stems and leaves of olive trees).
 - Production of compost.
- Business opportunity for SMSAs and young agripreneurs (rental of grinder or related service).
- Better adoption of innovative feed (mixture with cactus and other alternatives).



Small machines for seed treatment and sowing

- Support a local manufacturer in the development of a **mobile seed cleaning & treatment machines**.

↪ Clean and treat the seeds of barley, wheat, vetch, puffball, fava bean, etc. with the different sieves.

- Capacity: 1t/h
- Cost: TND 18,000

Distribution of 25 manual seeders (220 V, mobile).

↪ Improve the quantity (increase in biomass production by 20%) and the quality of seeds.

↪ Reduce workloads.



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Mobile seed cleaning & treatment machine impact

Cooperative (SMSA)	2019				2020			2021		
	Number of potential users (farmers)	Seeds cleaned and / or treated (tons)	Total net benefit (TND)	Number of users (farmers)	Seeds cleaned and / or treated (tons)	Total net benefit (TND)	Number of users (farmers)	Seeds cleaned and / or treated (tons)	Total net benefit (TND)	Number of users
El Amen	320	24.2	315	12	38.4	575	21	46.7	654	25
El Felah	200	47.3	-13	20	60.8	1.520	33	70.8	2.532	42
Ettaouen	350	145.7	1.467	95	480	11.520	220	745.3	559	330
Melyen	150	22.5	225	11	111.7	3.594	25	45	1.350	20
Total	1.020	239.7	1.994	138	690.9	17.209	299	907.8	5.095	417



Imported pelleting machines

- Introduction of Imported pelleting machine to farmers coopératives, associations, and agripreneurs for feed preservation and business development – livestock feed.

- Model 1: 150 kg/h; 220V; 2.700 TND

- Model 2: 500 kg/h; 380V; 9.000 TND

Ingredients: barley, wheat bran, olive pomace, alfalfa, faba beans, declassified dates.

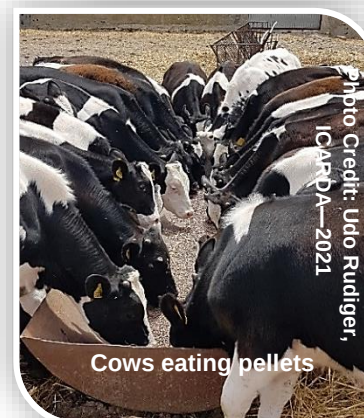
	Formula 1 (%)	Formula 2 (%)	Formula 3 (%)	Formula 4 (%)
Olive cake	34	45	-	-
Wheat bran	32	36	30	30
Grinded barley	-	-	15	15
Faba beans	30	-	-	-
Soy cake	-	15	-	-
Luzerne	-	-	9	9
Grinded Date kernels	-	-	40	-
Downgraded Dates	-	-	-	40
CMV (minerals)	4	4	6	6

Very feasible and profitable activity:

Cost of final feed produced: 350 – 900 TND/t compared to 1.200 TND/t of concentrate.

- Private entrepreneur started the local production of an efficient pelleting machines following the increase in the demand for such machines.

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Calculation of profitability (pellets)

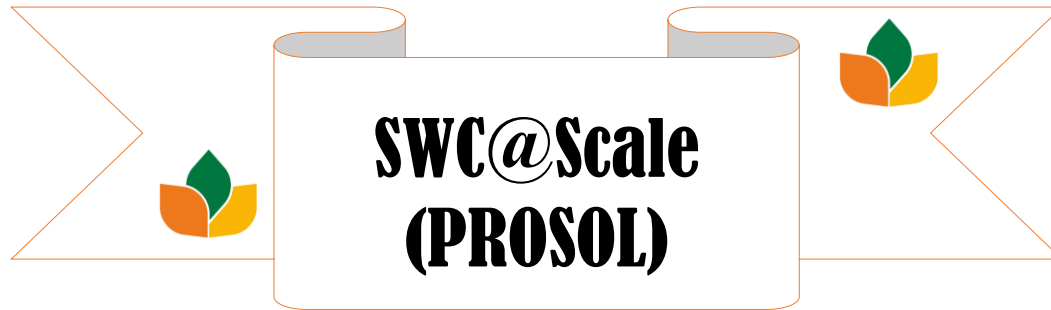
	Practical case 1	Practical Case 2	Practical case 3	Practical case 4	Practical case 5
Indicators	You Feed2 (Big machine)	SMSA Ankoud El Khaier 2 (Big machine)	Private breeder (Small machine)	SMSA Ettaaouan 2 (Big machine)	OEP/SMSA EL Marai-Kebil (Big machine)
Cost of Production (TND/Ton)	714.00	965.80	341.50	552.34	513.23
Production per year (T)	1200	1200	360	1200	1200
Average net income (TND/an)	5877.73	13422.12	5380.92	8136.9	2902.16
Profitability Index (PI)	4.57	10.43	10.34	15.34	2.25
Payback period of invested capital (years)	1.18	0.52	0.40	0.85	2.31
Net present value (NPV/TND)	32144.14	84954.8	23304.5	48147.37	11315.13
Cost benefit ratio (CBR)	3.57	9.43	9.34	14.34	1.25

Small machinery in the SWC@Scale (PROSOL)

1. El Khol,
Kairouan
2. Sers, Kef

Rhahla,
Siliana





Thank you for your attention