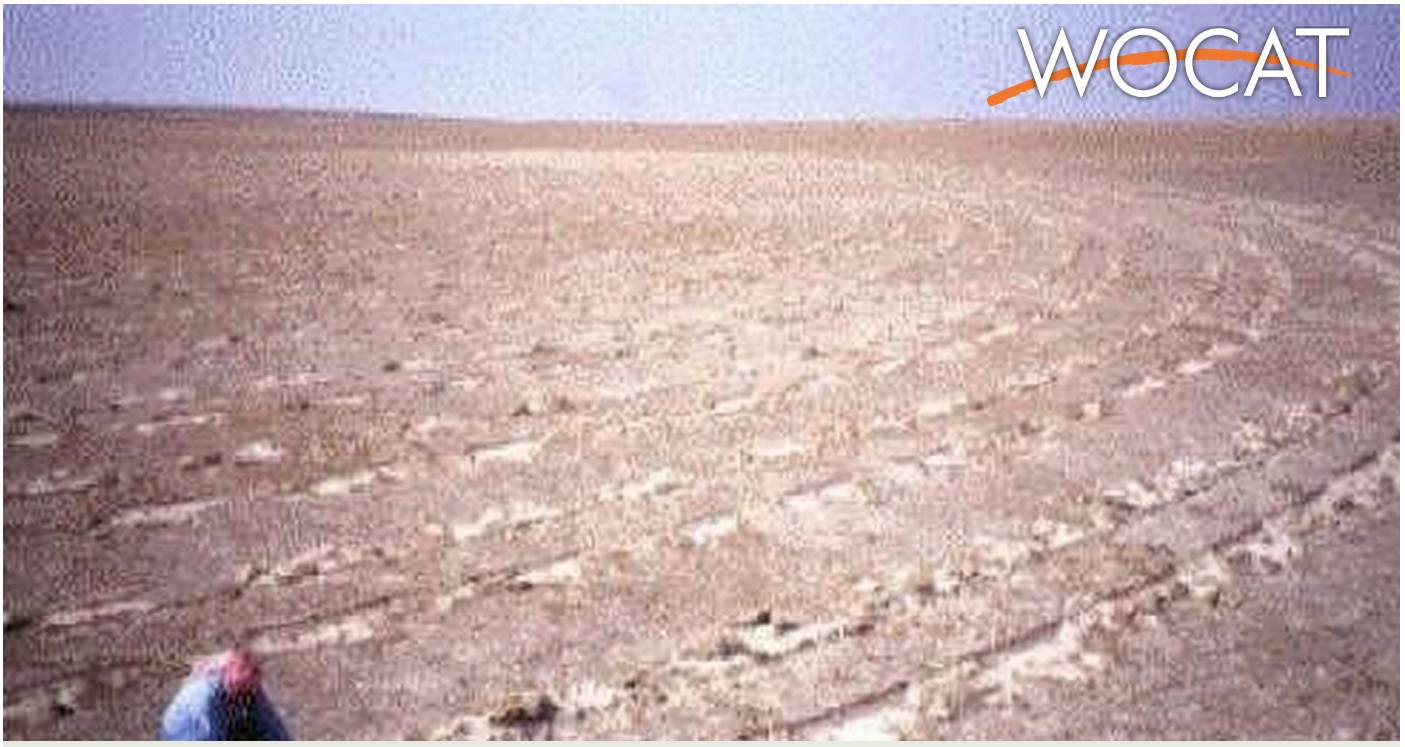


(Gustave Gintzburger (ICARDA))

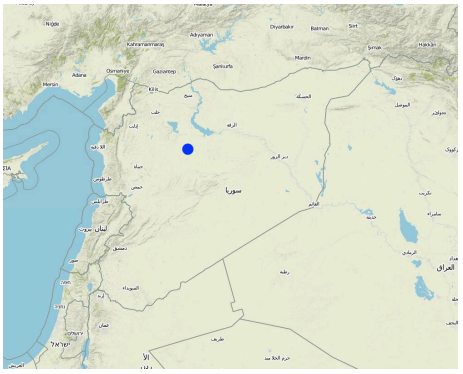
Range Pitting and Reseeding (Syrian Arab Republic)

Nakr al mara

DESCRIPTION

This technique is used to restore degraded rangelands (steppe areas) in the 150-200 mm rainfall zone in Syria. The technique is based on the pitting technique developed in Australia using the 'Camel Pitter' implement. The implement an be towed by an ordinary 2-wheel-drive pickup. Small ahallow 'pits' are scooped out by the action of inclined metal disks (similar to the disks of a disk plough). A seed hopper mounted on the top of the implement releases small quantities of range-plant seeds into the pits and an attached light harrow coveres the seeds with a thin layer of loose topsoil. The implement can also be used without the seeding device. The pits are usually made at the beginning ot just before the rainy season. In the soops made by the implement, rainwater collects and increases the soil moisture storage in and around the pits. On extremely shallow soils, pitting is not recommended because it removes the very top layer of soil and organic surface material and may expose the infertile subsoil. Seeds which emerge in the pits find favourable conditions for emergence and growth. During the early growth stages, the young plants are also sheltered by the pits from wind. The pitting machine should be pulled along the contour to optimize the capture of rainfall. Experience has shown that treating just 10-20 % of the area is sufficient to reestablish a 'starter vegetation' on completely denuded rangeland. In Syria, ARTEMISIA and SALSOLA species have been used successfully for rangeland reseeding. If used without the seeder, the pits will assist the reestablishment of the natural vegetation by providing sheltered and moist sites for seed emergence. To assure optimum reestablishment of vegetation, grazing should be controlled during the initial establishment phase.

LOCATION



Location: Obisan, Dalbouh, Aleppo Province, Syrian Arab Republic

No. of Technology sites analysed:

Geo-reference of selected sites
- 37.9468, 35.552

Spread of the Technology:

In a permanently protected area?:

Date of implementation: less than 10 years ago (recently)

Type of introduction
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☐ during experiments/ research
- ☑ through projects/ external interventions

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- ☐ improve production
- ☑ reduce, prevent, restore land degradation
- ☐ conserve ecosystem
- ☐ protect a watershed/ downstream areas – in combination with other Technologies
- ☐ preserve/ improve biodiversity
- ☐ reduce risk of disasters

Land use

Grazing land
- Nomadism

Water supply

- ☐ rainfed

- adapt to climate change/ extremes and its impacts
- mitigate climate change and its impacts
- create beneficial economic impact
- create beneficial social impact

- mixed rainfed-irrigated
- full irrigation

Purpose related to land degradation

- ☑ prevent land degradation
- reduce land degradation
- ☑ restore/ rehabilitate severely degraded land
- adapt to land degradation
- not applicable

Degradation addressed

soil erosion by wind - Et: loss of topsoil

water degradation - Ha: aridification

SLM group

- improved ground/ vegetation cover

SLM measures

TECHNICAL DRAWING

Technical specifications

Technical knowledge required for field staff / advisors: high

Technical knowledge required for land users: low

Main technical functions: improvement of ground cover, increase / maintain water stored in soil, water harvesting

Vegetative measure: pitting: scooping out very shallow pits
Vegetative material: O : other, O : other

Vegetative measure: Vegetative material: O : other, O : other

Vegetative measure: Vegetative material: O : other, O : other

Vegetative measure: Vegetative material: O : other, O : other

Other species: locally adapted rareseedinspecies, e.g., Atriplex halimus, Salsola vermiculata, Artemisia herba-alba

Gradient along the rows / strips: 0.00%

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **Syrian Pound**
- Exchange rate (to USD): 1 USD = 50.0 Syrian Pound
- Average wage cost of hired labour per day: 4.00

Most important factors affecting the costs

labour, slope, soil depth

Establishment activities

1. pitting (Timing/ frequency: beginning of the rainy season)

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Syrian Pound)	Total costs per input (Syrian Pound)	% of costs borne by land users
Labour					
Labour	ha	1.0	120.0	120.0	100.0
Equipment					
Machine use	ha	1.0	960.0	960.0	10.0
Plant material					
Seeds	ha	1.0	270.0	270.0	
Construction material					
Sand	ha	1.0	1.0	1.0	
Total costs for establishment of the Technology				**1'351.0**	
Total costs for establishment of the Technology in USD				*27.02*	

Maintenance activities

1. pitting (Timing/ frequency: beginning of the rainy season /annually where plants have not come up)

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Syrian	Total costs per input	% of costs borne by land

			Pound)	(Syrian Pound)	users
Labour					
Labour	ha	1.0	12.0	12.0	100.0
Equipment					
Machine use	ha	1.0	96.0	96.0	10.0
Plant material					
Seeds	ha	1.0	9.0	9.0	3.0
Total costs for maintenance of the Technology				**117.0**	
Total costs for maintenance of the Technology in USD				*2.34*	

NATURAL ENVIRONMENT

Average annual rainfall
- [x] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Agro-climatic zone
- [ ] humid
- [ ] sub-humid
- [ ] semi-arid
- [x] arid

Specifications on climate
Dryland area with 150-180 mm rain
Area not suitable for arable farming

Slope
- [x] flat (0-2%)
- [ ] gentle (3-5%)
- [ ] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [x] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude
- [ ] 0-100 m a.s.l.
- [x] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

Soil depth
- [x] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content
- [ ] high (>3%)
- [ ] medium (1-3%)
- [x] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [ ] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [ ] good
- [ ] medium
- [ ] poor/ none

Water quality (untreated)
- [ ] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Is salinity a problem?
- [ ] Yes
- [ ] No

Occurrence of flooding
- [ ] Yes
- [ ] No

Species diversity
- [ ] high
- [ ] medium
- [ ] low

Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [ ] less than 10% of all income
- [x] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [x] very poor
- [ ] poor
- [ ] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [ ] mechanized/ motorized

Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [ ] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [ ] women
- [ ] men

Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha

Scale
- [ ] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [x] state
- [ ] company
- [ ] communal/ village

Land use rights
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased

- 2-5 ha
- 5-15 ha
- 15-50 ha
- ✓ 50-100 ha
- 100-500 ha
- 500-1,000 ha
- 1,000-10,000 ha
- > 10,000 ha

- group
- individual, not titled
- individual, titled

- individual

Water use rights

- open access (unorganized)
- communal (organized)
- leased
- individual

Access to services and infrastructure

IMPACTS

Socio-economic impacts

fodder quality	decreased	increased
animal production	decreased	increased
farm income	decreased	increased

Socio-cultural impacts

conflict mitigation	worsened	improved

Ecological impacts

surface runoff	increased	decreased	Quantity before SLM: 45 Quantity after SLM: 5
soil moisture	decreased	increased	
soil cover	reduced	improved	
soil loss	increased	decreased	Quantity before SLM: 4 Quantity after SLM: 1
nutrient cycling/ recharge	decreased	increased	
plant diversity	decreased	increased	
animal diversity	decreased	increased	Improvement of wildlife
habitat diversity	decreased	increased	
wind velocity	increased	decreased	

Off-site impacts

Natural seed multiplication and supply	decreased	increased

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative	very positive
Long-term returns	very negative	very positive

Benefits compared with maintenance costs

Short-term returns	very negative	very positive
Long-term returns	very negative	very positive

CLIMATE CHANGE

-

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- single cases/ experimental
- 1-10%
- 11-50%
- > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- 0-10%
- 11-50%
- 51-90%
- 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- Yes
- No

To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Better vegetation growth

  How can they be sustained / enhanced? More involvement of the local community. Pay attention to land-use rights and land ownership
- Better feed resource

  How can they be sustained / enhanced? More involvement of the local community. Pay attention to land-use rights and land ownership

Strengths: compiler's or other key resource person's view

- cost-effective way to revegetate denuded rangeland

  How can they be sustained / enhanced? Protection from grazing for the first 3 years
- Increased range productivity

  How can they be sustained / enhanced? Better regulated grazing of the vegetation. Preventing overgrazing

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- The pitting machine removes the top 5 cm of soil and the vegetation over the area of the pit Method should not be used on extremely shallow soils

REFERENCES

Compiler
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Date of documentation: March 10, 2011

Last update: Aug. 2, 2019

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_1410/

Linked SLM data
Approaches: Government assisted rangeland rehabilitation https://qcat.wocat.net/en/wocat/approaches/view/approaches_2334/

Documentation was faciliated by

Institution
- Australian Revegetation Corporation Ltd - Australia
- International Center for Agricultural Research in the Dry Areas (ICARDA) - Lebanon
- Université de Strasbourg (UNISTRA) - France

Project
- n.a.