white soil on red soil (Corinne Corradi)

Adding Soil (Syrian Arab Republic)

Taghir al Turbe (arabic), akhelete (kurdish)

DESCRIPTION

To add red (fertile, nutrient rich) valley soil to degraded white soil on slopes (in olive orchards)

Red soil is taken from valley fields, mines and construction work, transported to the slopes and added around the stem of each tree, ca. 2 m^3 per tree. Not done in the rainy season and only when there is soil available and spare time.

Purpose of the Technology: increase the soil depth and add nutrients in response to erosion and nutrient mining.

Establishment / maintenance activities and inputs: every five to ten years depending on rainfall and slope.

LOCATION

Location: Idleb, Affrin, Aleppo, Syrian Arab Republic

No. of Technology sites analysed:

Geo-reference of selected sites
- 37.0, 35.0

Spread of the Technology:

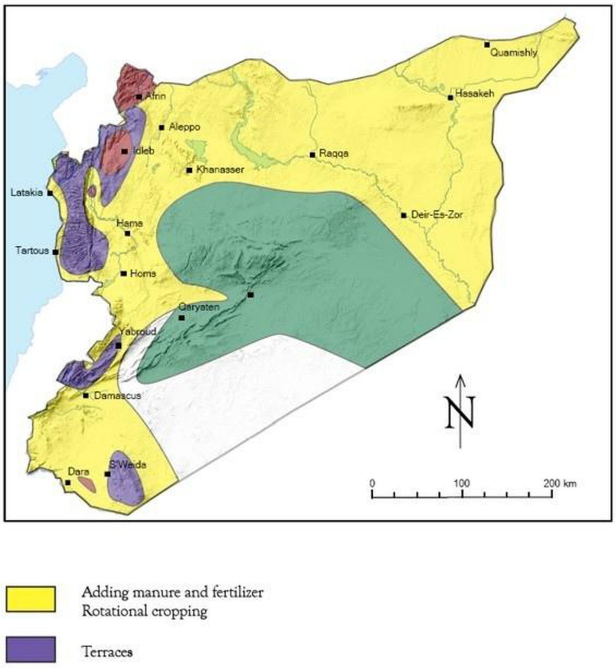
In a permanently protected area?:

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

red soil on white soil (Corinne Corradi)



5 major soil and water conservation technologies (Corinne Corradi)

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

Land use

Cropland

- Annual cropping
- Tree and shrub cropping: olive

Number of growing seasons per year: 1

Water supply

- ☑ rainfed
- ☐ 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 water - Wt: loss of topsoil/ surface erosion, Wg: gully erosion/ gullying, Wm: mass movements/ landslides

chemical soil deterioration - Cn: fertility decline and reduced organic matter content (not caused by erosion)

SLM group

- integrated soil fertility management

SLM measures

TECHNICAL DRAWING

Technical specifications

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **syrian pounds**
- Exchange rate (to USD): 1 USD = 50.0 syrian pounds
- Average wage cost of hired labour per day: 5.00

Most important factors affecting the costs

labour, distance, transport, probably in the future also value of soil

Establishment activities

1. digging soil (Timing/ frequency: dry season)
2. transport soil (Timing/ frequency: dry season)
3. distributing soil (Timing/ frequency: None)

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (syrian pounds)	Total costs per input (syrian pounds)	% of costs borne by land users

Labour					
Labour	ha	1.0	50.0	50.0	100.0
Equipment					
Machine use	ha	1.0	50.0	50.0	100.0
Construction material					
Earth	ha	1.0	100.0	100.0	100.0
Other					
Transport	ha	1.0	100.0	100.0	
Total costs for establishment of the Technology				**300.0**	
Total costs for establishment of the Technology in USD				*6.0*	

Maintenance activities

1. digging soil (Timing/ frequency: dry season / once)
2. transport soil (Timing/ frequency: dry season / once)
3. distributing soil (Timing/ frequency: once)

NATURAL ENVIRONMENT

Average annual rainfall

☐ < 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
☐ arid

Specifications on climate

n.a.

Slope

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

Landforms

☐ plateau/plains
☐ ridges
☐ mountain slopes
☑ hill slopes
☐ footslopes
☐ valley floors

Altitude

☐ 0-100 m a.s.l.
☑ 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

☑ 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)
☑ 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%)
☑ 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
☑ 10-50% of all income
☐ > 50% of all income

Relative level of wealth

☐ 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
☑ 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

Scale
☐ small-scale
☐ medium-scale
☐ large-scale

Land ownership
☐ state
☐ company
☐ communal/ village
☐ group
☐ individual, not titled
☑ individual, titled

Land use rights
☐ open access (unorganized)
☐ communal (organized)
☐ leased
☑ individual

Water use rights
☐ open access (unorganized)
☐ communal (organized)
☐ leased
☐ individual

Access to services and infrastructure

IMPACTS

Socio-economic impacts

Crop production	decreased	☐☐☐☐☐☑☐	increased	20-50% (red on white:63%, white on red: 38%)
production area (new land under cultivation/ use)	decreased	☐☐☑☐☐☐☐	increased	In case soil is taken from good valley fields
economic disparities	increased	☐☐☐☑☐☐☐	decreased	

Socio-cultural impacts

community institutions	weakened	☐☐☐☑☐☐☐	strengthened	
national institutions	weakened	☐☐☐☑☐☐☐	strengthened	
SLM/ land degradation knowledge	reduced	☐☐☐☑☐☐☐	improved	

Ecological impacts

soil moisture	decreased	☐☐☐☐☑☐☐	increased	For white on red soil, increased sand content may result in better infiltration and reduces cracks of topsoil, increased moisture in subsoil reported by farmers
nutrient cycling/ recharge	decreased	☐☐☑☐☐☐☐	increased	Adding white soil adds high active CaCO3, which might decrease availabilty of cation nutrients
pest/ disease control	decreased	☐☐☑☐☐☐☐	increased	Spreading of soil-borne diseases. Especially Vertcillium Wilt, also Verticillium Dahliae

Off-site impacts

reliable and stable stream flows in dry season (incl. low flows)	reduced	☐☐☐☑☐☐☐	increased	
downstream flooding (undesired)	increased	☐☐☐☑☐☐☐	reduced	
downstream siltation	increased	☐☐☐☑☐☐☐	decreased	Downfields will benefit if erosion is not stopped
groundwater/ river pollution	increased	☐☐☐☑☐☐☐	reduced	
wind transported sediments	increased	☐☐☐☑☐☐☐	reduced	

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

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ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology
☐ single cases/ experimental
☐ 1-10%
☐ 11-50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?
☐ 0-10%
☐ 11-50%
☐ 51-90%

☐ > 50%	☑ 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

- fast increase in yield
- reverse the effects of erosion

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

- reverse the effects of erosion

  How can they be sustained / enhanced? combine with other conservation technologies (stone bands etc.)
- soil that otherwise wouldn't be used can be used in this way

  How can they be sustained / enhanced? offer free transport of soil by government or other organisation
- don't have to apply to the entire field, possibility to keep investment down

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

- expensive for the entire field not

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

- it is not sustainable combine with conservation strategies like terraces, bands, less tillage
- soil born disease spreading soil analysis before adding and if positive either apply quarantine and solarization or leave it

REFERENCES

Compiler	Editors	Reviewer
Liesbeth Colen		Fabian Ottiger Alexandra Gavilano

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Resource persons

Liesbeth Colen - SLM specialist
Sarah van Steenwinkel - SLM specialist

Full description in the WOCAT database

https://qcat.wocat.net/en/wocat/technologies/view/technologies_1004/

Linked SLM data

Approaches: Adding soil https://qcat.wocat.net/en/wocat/approaches/view/approaches_2624/

Documentation was faciliated by

Institution

- n.a.

Project

- n.a.

Key references

- Soil transfers in olive orchards of NS Syria, a bio-physical and socio-economic analysis of a local innovation. June 2007.: ICD Bern