Use of manure in a field with stone bunds pierreux. (PATECORE)

Use of organic matter (manure and compost) (Burkina Faso)

Apport de matière organique (French)

DESCRIPTION

Soils treated with compost or manure produce better yields, because they retain water better and are more fertile.

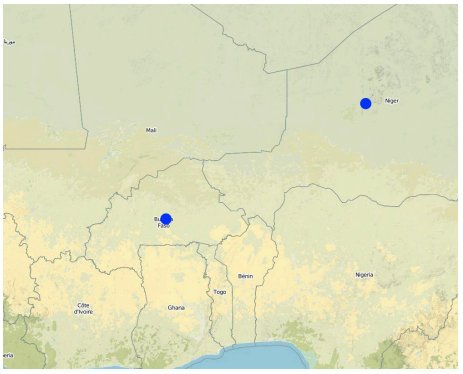
The regular application of manure and/or compost in sufficient quantities makes farming more intensive and reduces the need to bring more land under cultivation. Manure is used on cropland and compost is recommended particularly for market gardening.

Purpose of the Technology: The use of organic matter on cropland has three major effects: it reactivates biological activity, increases soil fertility by providing nutrients and improves soil structure by increasing the amount of organic matter in it. The improved soil structure also increases the infiltration of water into the soil. These effects favour crop growth and increase yields. The denser vegetation and improved soil structure make the land more resistant to water and wind erosion.

Establishment / maintenance activities and inputs: There are two methods for obtaining organic matter for use as a fertiliser: the production of compost and the collection of manure. Manure is collected from improved livestock pens or sheds where livestock is kept on litter or bedding. Compost can be made in the dry season or in the rainy season. Biodegradable matter is mixed with animal waste for rapid decomposition or just with millet, sorghum or other plant stalks for slow decomposition. Both types of compost can be enriched with ash and/or natural phosphate. The biodegradable matter is placed in a pit. In the dry season, it is regularly sprinkled with water until decomposition is complete. It is then spread evenly over the land before sowing or planting.
Unlike compost, manure collected from improved pens or livestock sheds is not completely decomposed, and the decomposition process continues over several years.
The recommended amount varies depending on the type of soil the availability of manure and compost: 6 t/ha every third year (heavy clayey soils), 3t/ha every two years (sandy-clayey soils) or 2t/ha every year (light soils).

Natural / human environment: The use of compost and manure is recommended in conjunction with all other SWC/SPR measures to achieve the maximum benefit from investments in land improvement.

LOCATION



Location: Burkina Faso, Niger, Burkina Faso

No. of Technology sites analysed:

Geo-reference of selected sites
- -1.56408, 12.24202
- 8.08182, 17.61167

Spread of the Technology: evenly spread over an area

In a permanently protected area?:

Date of implementation: 10-50 years ago

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

Cropland
- Annual cropping

Number of growing seasons per year: 1

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
- [x] improve fertility

- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [ ] prevent land degradation
- [x] reduce land degradation
- [x] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion

soil erosion by wind - Et: loss of topsoil

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

biological degradation - Bq: quantity/ biomass decline, Bl: loss of soil life

water degradation - Ha: aridification

SLM group

- integrated soil fertility management

SLM measures

agronomic measures - A2: Organic matter/ soil fertility

TECHNICAL DRAWING

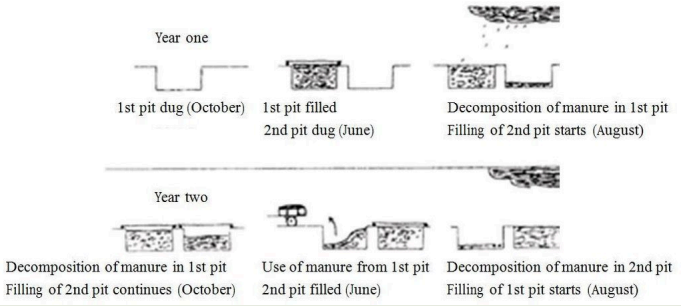
Technical specifications

Biodegradable matter is mixed with animal waste for rapid decomposition or just with millet, sorghum or other plant stalks for slow decomposition. The biodegradable matter is placed in a pit. In the dry season, it is regularly sprinkled with water until decomposition is complete. It is then spread evenly over the land before sowing or planting.

Technical knowledge required for field staff / advisors: moderate
Technical knowledge required for land users: low

Main technical functions: improvement of ground cover, improvement of surface structure (crusting, sealing), improvement of topsoil structure (compaction), increase in organic matter, increase in nutrient availability (supply, recycling,...), increase of infiltration, increase / maintain water stored in soil, increase of biomass (quantity), promotion of vegetation species and varieties (quality, eg palatable fodder)
Secondary technical functions: water harvesting / increase water supply, sediment retention / trapping, sediment harvesting, reduction in wind speed

Manure / compost / residues
Material/ species: Biodegradable matter, animal waste, plant stalks, ash and/or natural phosphate, manure collected



Author: PASP

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **n.a.**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: n.a

Most important factors affecting the costs

Production of compost: • constructing pits or basins • water • equipment (shovel, wheelbarrow, etc.). Use of compost: • transportation to plot by cart (100 kg of manure per donkey cartload) • transportation to plot in head baskets (20 kg of manure per basket) • spreading the compost on the plot (labour).

Establishment activities

n.a.

Maintenance activities

1. Biodegradable matter is mixed with animal waste for rapid decomposition or just with millet, sorghum or other plant stalks for slow decomposition (Timing/ frequency: None)
2. The biodegradable matter is placed in a pit. (Timing/ frequency: None)
3. In the dry season, it is regularly sprinkled with water until decomposition is complete (Timing/ frequency: None)
4. It is then spread evenly over the land before sowing or planting. (Timing/ frequency: None)

NATURAL ENVIRONMENT

Average annual rainfall
- [ ] < 250 mm
- [ ] 251-500 mm
- [x] 501-750 mm
- [x] 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
- [x] semi-arid
- [ ] arid

Specifications on climate
Thermal climate class: subtropics

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

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

Altitude
- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [x] 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)
- [x] 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)
- [x] 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
- [x] 5-50 m
- [ ] > 50 m

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

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

Water quality refers to:

Is salinity a problem?
- [ ] Ja
- [ ] Nee

Occurrence of flooding
- [ ] Ja
- [ ] Nee

Species diversity
- [ ] high
- [ ] medium
- [x] 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
- [x] very poor
- [x] 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
- [x] 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
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [x] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled

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

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

Access to services and infrastructure

health	poor	✓	good
education	poor	✓	good
technical assistance	poor	✓	good

employment (e.g. off-farm)	poor	good
markets	poor	good
energy	poor	good
roads and transport	poor	good
drinking water and sanitation	poor	good
financial services	poor	good

IMPACTS

Socio-economic impacts

Crop production	decreased	increased
expenses on agricultural inputs	increased	decreased
farm income	decreased	increased
workload	increased	decreased

Socio-cultural impacts

food security/ self-sufficiency	reduced	improved
SLM/ land degradation knowledge	reduced	improved
livelihood and human well-being	reduced	improved

The use of compost and manure improves yields and output, thereby improving food security. The sale of surplus production also increases household income

Ecological impacts

harvesting/ collection of water (runoff, dew, snow, etc)	reduced	improved
surface runoff	increased	decreased
soil moisture	decreased	increased
soil cover	reduced	improved
soil loss	increased	decreased
soil crusting/ sealing	increased	reduced
nutrient cycling/ recharge	decreased	increased
biomass/ above ground C	decreased	increased
pest/ disease control	decreased	increased
wind velocity	increased	decreased

The use of partially decomposed manure also exposes crops to certain pests and to the risk of being scorched

Off-site impacts

downstream flooding (undesired)	increased	reduced
downstream siltation	increased	decreased
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

Gradual climate change

annual temperature increase	not well at all	very well

Climate-related extremes (disasters)

local rainstorm	not well at all	very well
local windstorm	not well at all	very well
drought	not well at all	very well
general (river) flood	not well at all	very well

Other climate-related consequences

reduced growing period	not well at all	very well

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?

- [ ] Ja
- [ ] Nee

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

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

- reactivates biological activity, increases soil fertility by providing nutrients and improves soil structure by increasing the amount of organic matter in it
- The improved soil structure also increases the infiltration of water into the soil
- The use of compost and manure improves yields and output, thereby improving food security. The sale of surplus production also increases household income.
- The denser vegetation and improved soil structure make the land more resistant to water and wind erosion.

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

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

- Manure and compost are often not available in sufficient quantities In spite of these drawbacks, manure is the form of fertilisation most commonly used by farmers, as it requires less work than compost.
- Water is required to moisten compost during the dry season in order to ensure that it is kept at the right temperature for the decomposition of the biomass
- transporting manure and compost poses a major hurdle for poor farmers who do not have a cart. This is a particularly serious problem when plots are at a distance from the village (outfields).
- farmers are deterred from composting in the dry season because a nearby supply of water is needed and it involves a considerable amount of work
- The use of manure on farmland entails some risks and disadvantages. As the manure is only partially decomposed – decomposition starts after the first rains begin – crops do not have enough nitrogen for a time. The use of partially decomposed manure also exposes crops to certain pests and to the risk of being scorched.

REFERENCES

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Full description in the WOCAT database
https://qcat.wocat.net/af/wocat/technologies/view/technologies_1220/

Linked SLM data
n.a.

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Key references
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