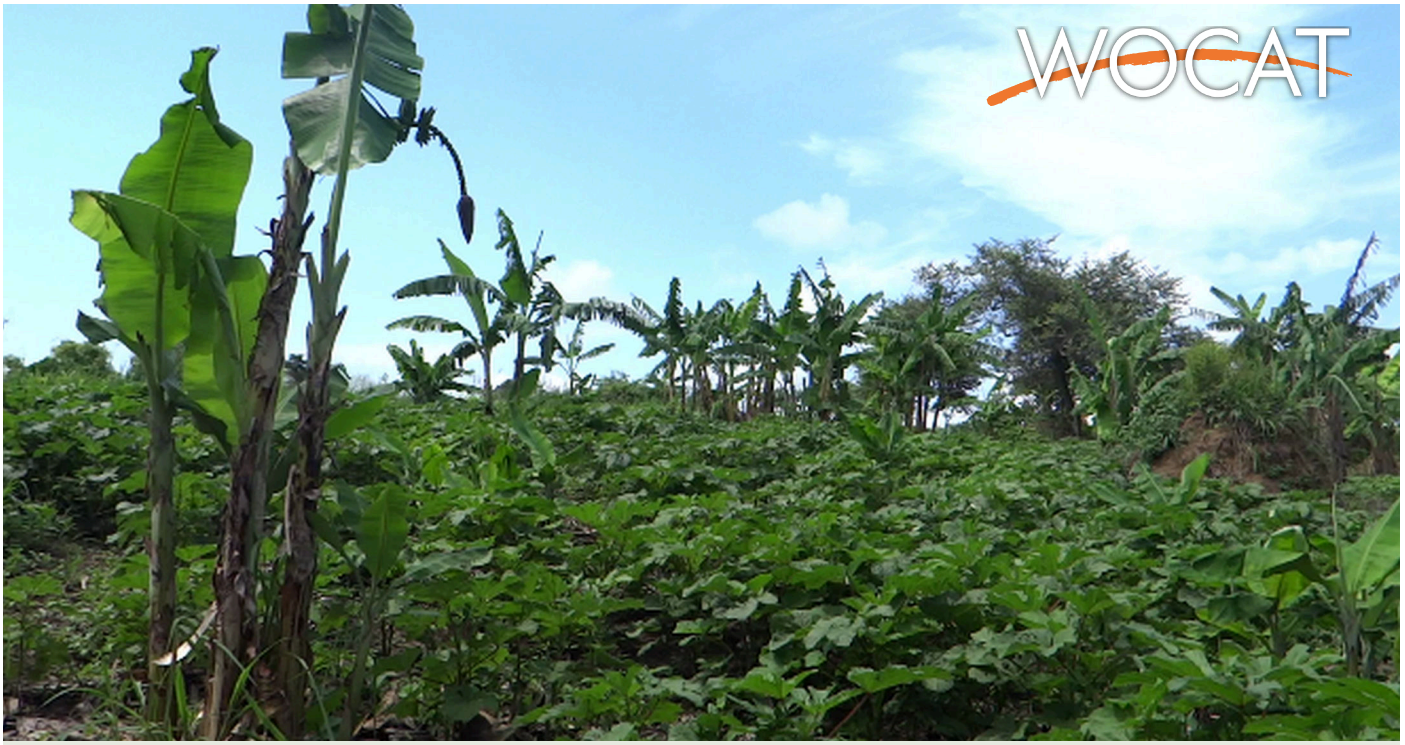


A banana plantation protected from winds by woodland in Northern Uganda (Issa Aliga)

Woodland-Protected Banana Cultivation for Increased Production and Household Income (Uganda)

Pito Labolo ki pot dek

DESCRIPTION

A banana plantation established in an area surrounded by natural woodland vegetation is protected from excessive drought and winds, ensuring continuous production and increased income throughout the year

Strong dry winds in the plains of northern Uganda can be a serious challenge during dry periods, destroying perennial crops and farm structures. To overcome this challenge, farmers maintain blocks of natural vegetation around their plantations. In the case of this technology, the farmer has maintained natural vegetation around his banana plantation. Within the plantation there are other crops such as vegetables. The trees in the natural vegetation provide shade to the crops and act as wind breaks to the banana plantation.

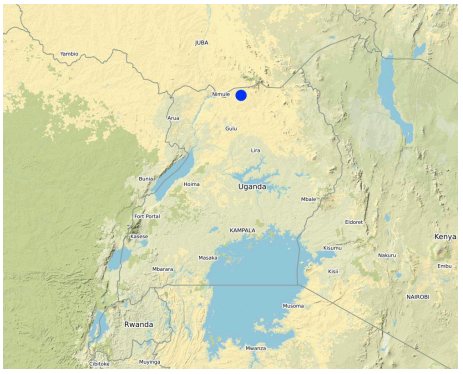
The size of the plantation is approximately 2 acres. On either side of the plantation is a strip of natural vegetation with a variety of trees species but mainly drought-tolerant species such as Cobretum molle, Albizia coriaria and Accia seyal. Under these trees are grasses which are some times used for livestock. The distance between the banana plantation and the natural woodland is approximately 3 meters and the natural vegetation is approximately 5 meters wide. During the dry season the tall grass from the natural vegetation, if not used for livestock, is harvested and used as mulch in the banana plantation. This also serves to reduce the fire hazard that may spread from the natural vegetation into the plantations. It is also from the farmer's natural vegetation that sometimes poles are cut and used to support heavy bunches of growing bananas.

Generally, the technology does not require a lot of inputs, since bananas are a perennial crop requiring no regular purchase of seeds/seedlings. The major inputs that require regular supply are grass mulch and manure. The farmer usually gets the grass mulch from the natural woodland next to the bananas. He obtains the manure from either of his five cows in the Kraal or purchases additional animal manure from neighbors. On average the farmer adds three tons of manure each year and about a ton of mulch per year. The advantage is that mulch also decomposes easily and adds to the soil carbon and therefore the fertility of the soil. The labor for the work in the plantation is mainly household-based.

To be able to maintain his technology, the farmers need to have adequate labor to maintain a clear separation between the banana plantation and the natural woodland. The farmers also requires labor to manage the grass in the natural woodland so that it does not out grow to pose a fire risk and provide habitat for other dangerous animals like snakes and rodents.

This technology is suitable in areas where grazing is not a major farming activity because livestock can easily cross from the woodland into the banana plantation and destroy it in a very short time.

LOCATION



Location: Pabbo Sub-county, Amuru District, Northern Uganda, Northern Region,Uganda, Uganda

No. of Technology sites analysed: single site

Geo-reference of selected sites
- 32.5349, 3.5701

Spread of the Technology: evenly spread over an area (approx. < 0.1 km2 (10 ha))

Date of implementation: 2009

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

Photo showing protected woodland under banana plantation in Northern Uganda (Isa Aliga)

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
- [x] reduce risk of disasters
- [x] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact

Land use

Mixed (crops/ grazing/ trees), incl. agroforestry - Agro-pastoralism

Water supply

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

Number of growing seasons per year: 2
Land use before implementation of the Technology: n.a.
Livestock density: n.a.

Purpose related to land degradation

- [x] 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

physical soil deterioration - Pc: compaction

biological degradation - Bc: reduction of vegetation cover

SLM group

- agroforestry
- windbreak/ shelterbelt
- improved ground/ vegetation cover

SLM measures

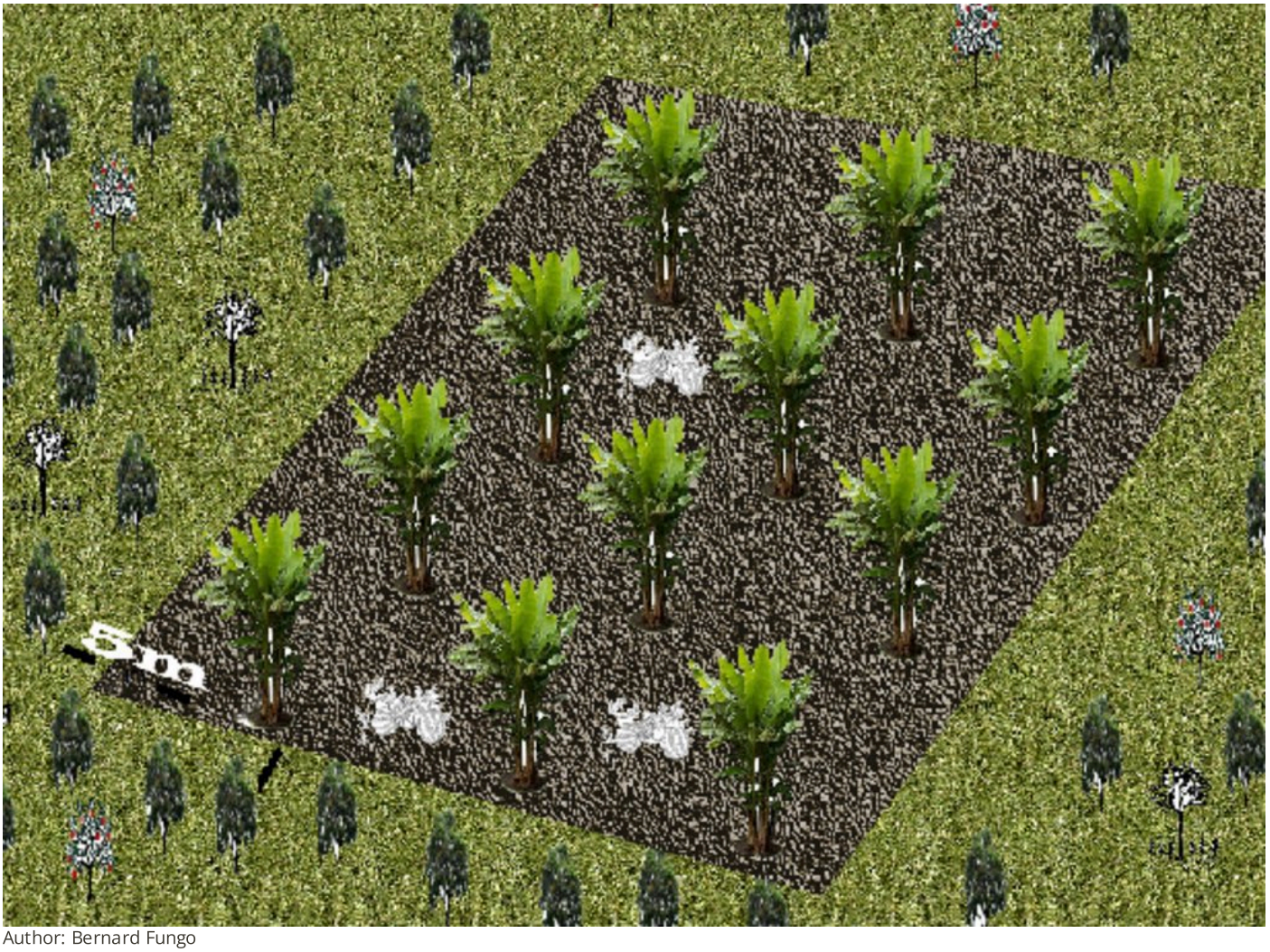
agronomic measures - A1: Vegetation/ soil cover

vegetative measures - V1: Tree and shrub cover

structural measures - S9: Shelters for plants and animals

TECHNICAL DRAWING

Technical specifications



Author: Bernard Fungo
Distance between banana plantation and woodland is approximately 5 meters with short grass (~ 3-5 cm height)
The width of the woodland is ~5 m
The banana plantation is ~ 2 acres

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **2 acres**; conversion factor to one hectare: **1 ha = 2.5**)
- Currency used for cost calculation: **Uganda Shillings**
- Exchange rate (to USD): 1 USD = 3500.0 Uganda Shillings
- Average wage cost of hired labour per day: 5000

Most important factors affecting the costs

Purchase and application of manure

Establishment activities

1. Slaching (Timing/ frequency: Three times every season)
2. Manure application (Timing/ frequency: At start of theraininy eason)
3. Mulching (Timing/ frequency: At start of dry season)

Establishment inputs and costs (per 2 acres)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Slashing	Days	60.0	5000.0	300000.0	100.0
Manure application	Days	20.0	5000.0	100000.0	100.0
Mulching	Days	20.0	5000.0	100000.0	100.0
Plant material					
Dry grass	Ton	1.0	100000.0	100000.0	100.0
Fertilizers and biocides					
Animal manure	Ton	2.0	150000.0	300000.0	100.0
Total costs for establishment of the Technology				**900'000.0**	

Maintenance activities

1. Slashing (Timing/ frequency: Three times a season)
2. Manure application (Timing/ frequency: At start of rainy season)

3. Mulching (Timing/ frequency: At start of dry season)

Maintenance inputs and costs (per 2 acres)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Slashing	Days	60.0	5000.0	300000.0	100.0
Manure application	Days	20.0	5000.0	100000.0	100.0
Mulching	Days	20.0	5000.0	100000.0	100.0
Plant material					
Dry grass	Ton	1.0	100000.0	100000.0	100.0
Fertilizers and biocides					
Manure	Ton	2.0	150000.0	300000.0	100.0
Total costs for maintenance of the Technology				**900'000.0**	

NATURAL ENVIRONMENT

Average annual rainfall
- [ ] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [x] 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
- [x] sub-humid
- [ ] semi-arid
- [ ] arid

Specifications on climate
n.a.

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

Landforms
- [x] plateau/plains
- [x] 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.
- [x] 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
- [x] not relevant

Soil depth
- [ ] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [x] 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)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

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

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

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

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

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

Occurrence of flooding
- [ ] Yes
- [x] No

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

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

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [x] 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
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

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

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

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative

Gender
- [ ] women
- [x] men

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

- [ ] employee (company, government)

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [x] 5-15 ha
- [ ] 15-50 ha
- [x] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

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

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

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

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

Improved crop yields since effects of crops fall are reduced

land management: hindered — simplified

Easy to manage field. Surrounding trees provide stakes for bananas

farm income: decreased — increased

More yield brings about more income the farmer

Socio-cultural impacts

Ecological impacts

soil cover: reduced — improved

Grass provides additional mulch cover to the soil surface

nutrient cycling/ recharge: decreased — increased

Tree leaves and mulch decompose to replenish the nutrients lost

soil organic matter/ below ground C: decreased — increased

Tree leaves and mulch decompose to provide humus

vegetation cover: decreased — increased

More diverse vegetation types on the land

fire risk: increased — decreased

Since grasses are cut and applied as mulch, fire does not easily spread in to the area

wind velocity: increased — decreased

Trees act as wind breaks to reduce wind speed

micro-climate: worsened — improved

The combination of trees, grass and bananas creates a conducive micro climate for biodiversity survival

Off-site impacts

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

The farmer is able to realize some benefits within the first few years of establishment. However with time, benefits become more.

CLIMATE CHANGE

Gradual climate change

annual temperature decrease	not well at all ✓ very well		
seasonal temperature decrease	not well at all ✓ very well	Season: wet/ rainy season	
annual rainfall increase	not well at all ✓ very well		
seasonal rainfall decrease	not well at all ✓ very well	Season: wet/ rainy season	

Climate-related extremes (disasters)

local windstorm	not well at all ✓ very well
drought	not well at all ✓ very well
land fire	not well at all ✓ very well

ADOPTION AND ADAPTATION

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

- [x] single cases/ experimental
- [ ] 1-10%
- [ ] 10-50%
- [ ] more than 50%

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

- [x] 0-10%
- [ ] 10-50%
- [ ] 50-90%
- [ ] 90-100%

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

- [ ] Yes
- [x] 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

- The practices needed can be performed by the farmers without technical input
- Multiple products from the gardens since bananas are continuous fruiters and the woodland provides continuous supply of fuel wood for domestic use

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

- The woodland acts as a buffer against destruction by winds since bananas are very fragile crops under strong winds
- The cost to maintaining the technology is generally, low, with no major external inputs

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

- The woodland adjacent to the banana plantation can acts as hiding place for wild animals as well as pests and diseases Ensure that the woodland is properly cleared, maintaining low grass and not allowing the branches to overlap between trees
- Land shortage cannot allow the expansion of the woodland buffer, thereby limiting effectiveness of the buffer Alter the species composition of the woodland to include tall trees among the shorter ones

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

- Bananas are susceptible to pests and diseases that may come from the woodland Maintain proper plant hygiene in the banana plantation and use pesticides where necessary
- Maintaining a banana plantation requires a lot of labor to apply manure and mulch Apply mulch only when necessary
- Bananas are easily damaged by drought, which is a common occurrence in northern Uganda Maintain heavy mulch during the dry season to conserve soil moisture and ensure crop survival

REFERENCES

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_2839/

Linked SLM data
n.a.

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