The picture shows a section of the 1.5 acre piece of land (Amon Aine)

# Lab lab inter-crop for improvement of soil fertility for banana production (Uganda)

Lablab Omurutokye

## DESCRIPTION

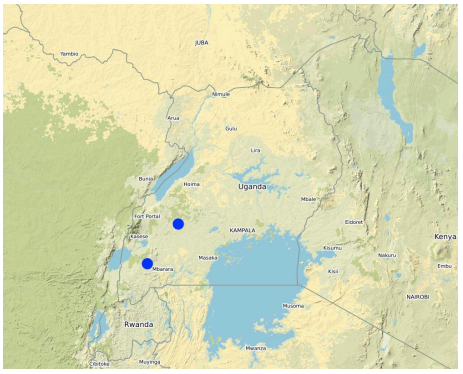
**Lab lab (Lablab purpureus) is planted in a banana garden and trained to creep in the empty spaces for suppressing weeds, stabilizing the soil, fixing atmospheric nitrogen and controlling water runoff.**

The lab lab (Velvet), commonly called bataw or jarabilla, is widespread throughout the tropics. The legume is characterized by creeping and is normally planted as a cover crop in plantations where it is allowed to cover the open spaces. The leguminous crop is normally promoted and planted in banana gardens for it's immense potential to control weeds and improve and conserve soil fertility. As an inter-crop, lab lab is usually combined with other crops for its high potential of fixing atmospheric nitrogen, controlling soil erosion, providing green manure and retaining soil moisture in support of the other crops. As a mono crop, lab lab is planted on bare land at all slope angles and at any scale to support the soil structure and to control run off. The leguminous plant is also known to be highly nutritious for livestock farming and is used to add protein content value to other pastures when making good quality fodder, silage and hay.

The lablab in the banana garden was established about 1.5 years ago; establishment of lablab legume in the banana garden is defined by the farmer to be simple and cheap depending on the size of land. The activities involved in establishing the cover crop include (1) weeding the garden to provide a competition free environment for the legume to grow. (2) Sowing of the seeds in the garden a few weeks to the start of the wet season (3) training of the germinating lablab at least 0.75 m away from the banana plants. The main maintenance activity involved is training the cover crops from invading the banana plants to avoid competition for nutrients.

The equipment required is only a hoe on small scale farms and maybe a tractor or curt on large scale farms. The expenses involved in the establishment process of lablab legume in a garden of 1.5 acres are mainly dependent on the availability of seed and labor. A kilogram of lablab seed was enough and costs the farmer $1.38, the labor to plough the banana plantation was provided by two of family members for 3 days valued at a total of $5.83. The profitability of the technology by the farmer where seen in the improvement in banana bunch size and the ever green banana plants maintained during the wet and dry season. The farmer before establishing lablab harvested banana bunches of sizes valued at US $ 2.78 – US $ 4.17 but today produces bigger bunches and sells at a price between US $ 4.17 – 5.56 on the local market. The average number of bunches harvested per month is also realized to have improved from 112 to 160 bunches. The weeds in the garden are no longer a big problem to the farmer and the soil moisture can be observed on the ground. The leaves of lablab also decompose as manure in addition to the known leguminous function of nitrogen fixation.

## LOCATION




**Location:** Fort Portal Municipality, Njara Sub County, Western Uganda, Kabarole District, Uganda

**No. of Technology sites analysed:** 2-10 sites

**Geo-reference of selected sites**

- 31.0239, 0.4753
- 30.27319, -0.47869
- 30.27319, -0.47869

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

**Date of implementation:** 2016

**Type of introduction**

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

The photo is a section of the 1.5 acres piece of land on which the farmer has inter-cropped lab lab beans with bananas. (Aine Amon)

## CLASSIFICATION OF THE TECHNOLOGY

### Main purpose

- [x] improve production
- [x] 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
- [x] create beneficial economic impact
- [ ] create beneficial social impact

### Land use

**Cropland** - Perennial (non-woody) cropping
Main crops (cash and food crops): Bananas

### Water supply

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

**Number of growing seasons per year:** 2
**Land use before implementation of the Technology:** The farmer previously inter-cropped bananas with beans and maize, the beans planted were for domestic food security. With the introduction of lab lab a perennial crop, the beans and maize are no longer part of the gardening system which has improved the quality and quantity of bananas harvested.
**Livestock density:** 2 goats and 3 pigs kept on zero grazing at subsistence scale

### Purpose related to land degradation

- [x] prevent land degradation
- [ ] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [x] 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)

### SLM group

- improved ground/ vegetation cover
- integrated soil fertility management
- ground water management

### SLM measures

**vegetative measures** - V2: Grasses and perennial herbaceous plants

## TECHNICAL DRAWING

### Technical specifications


Author: Prosy Kaheru
The banana plantains are spaced 3 x 3 m between plants. The lab lab (Velvet) bean is planted and trained to creep in the open spaces, 0.75m away from the base of the banana.

## ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

### Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **Acre**; conversion factor to one hectare: **1 ha = 2.5**)
- Currency used for cost calculation: **Uganda Shilling**
- Exchange rate (to USD): 1 USD = 3600.0 Uganda Shilling
- Average wage cost of hired labour per day: 3500

### Most important factors affecting the costs

The availability of lablab bean seeds for planting and the availability of labor required for preparing the garden

### Establishment activities

1. weeding the plantation (Timing/ frequency: A month to the rain season)
2. Seeding (Timing/ frequency: Three weeks to the rain season)
3. Training the creeping direction of the legume (Timing/ frequency: A month in the rain season)

### Establishment inputs and costs (per Acre)

| Specify input | Unit | Quantity | Costs per Unit (Uganda Shilling) | Total costs per input (Uganda Shilling) | % of costs borne by land users |
|---|---|---|---|---|---|
| **Labour** | | | | | |
| Labor for 3days | Man days | 6.0 | 6000.0 | 36000.0 | 100.0 |
| **Equipment** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Hire a hoe | Pieces | 2.0 | 1000.0 | 2000.0 | 100.0 |
| **Plant material** | | | | | |
| Lablab bean seeds | Kilo grams | 1.0 | 5000.0 | 5000.0 | 100.0 |
| **Total costs for establishment of the Technology** | | | | **43'000.0** | |

Maintenance activities

1. Training the creeping lab lab bean (Timing/ frequency: A month in the rainy season)
2. Harvesting the fodder for pigs and goats (Timing/ frequency: Two months after the planting)

Maintenance inputs and costs (per Acre)

| Specify input | Unit | Quantity | Costs per Unit (Uganda Shilling) | Total costs per input (Uganda Shilling) | % of costs borne by land users |
|---|---|---|---|---|---|
| **Labour** | | | | | |
| Training of creeping lab lab beans twice a year | mandays | 2.0 | 6000.0 | 12000.0 | 100.0 |
| Harvesting the ready lab lab for goats and pig fodder | Manhours | 30.0 | 1000.0 | 30000.0 | 100.0 |
| **Total costs for maintenance of the Technology** | | | | **42'000.0** | |

## NATURAL ENVIRONMENT

### Average annual rainfall

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

### Agro-climatic zone

- [x] humid
- [ ] sub-humid
- [ ] semi-arid
- [ ] arid

### Specifications on climate

n.a.

### Slope

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

### Landforms

- [ ] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [x] 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
- [ ] < 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)
- [x] 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

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

### Off-farm income

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

### Individuals or groups

- [x] individual/ household
- [ ] groups/ community

### Gender

- [x] women
- [x] men

### Age

- [ ] children
- [ ] youth

- [ ] Nomadic
- [ ] cooperative
- [ ] employee (company, government)
- [x] middle-aged
- [ ] elderly

### Area used per household
- [ ] < 0.5 ha
- [x] 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
- [ ] 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)
- [x] 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 | Quantity before SLM: 50<br>Quantity after SLM: 65 |
| crop quality | decreased | increased | Bigger bunches of matooke at all times of the year. |
| fodder production | decreased | increased | More leave-material for feeding goats and pigs is available. |
| risk of production failure | increased | decreased | The dry season normally retards banana production. However, this is now minimized through the moisture retention capacity of lab lab. |
| expenses on agricultural inputs | increased | decreased | Weeding expenses no longer incurred. |

### Socio-cultural impacts

### Ecological impacts

| | | | |
|---|---|---|---|
| surface runoff | increased | decreased | Lab lab is a cover crop and contributes to reducing the rainwater run-off. |
| soil moisture | decreased | increased | |
| soil cover | reduced | improved | |
| soil loss | increased | decreased | |
| soil crusting/ sealing | increased | reduced | |
| soil compaction | increased | reduced | |
| nutrient cycling/ recharge | decreased | increased | |
| soil organic matter/ below ground C | decreased | increased | |
| vegetation cover | decreased | increased | |
| biomass/ above ground C | decreased | increased | |
| flood impacts | increased | decreased | |
| drought impacts | increased | decreased | |

### Off-site impacts

| | | |
|---|---|---|
| water availability (groundwater, springs) | decreased | increased |
| impact of greenhouse gases | 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 | |
| seasonal temperature increase | not well at all ✓ very well | Season: dry season |
| annual rainfall decrease | not well at all ✓ very well | |
| seasonal rainfall increase | not well at all ✓ very well | Season: wet/ rainy season |

**Climate-related extremes (disasters)**

| | |
|---|---|
| local rainstorm | not well at all ✓ very well |
| drought | 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?**

- [ ] 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**

- Manure from falling leaves
- Suppresses weeds
- Feed for animals

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

- Improves moisture retention in the soil
- Reduces run off
- Nitrogen fixation into the soil
- Establishment is cheap and needs simple tools like hoes

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

- The cover crop is invasive and doesn't favor inter cropping

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

- The foliage may be a habitat to vermins like snakes and rats
  Setting traps in case of infestation

## REFERENCES


**Compiler**
Aine Amon

**Editors**
Drake Mubiru

**Reviewer**
Nicole Harari
Donia Mühlematter
Udo Höggel



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**Resource persons**
Janet Kabasi - land user

**Full description in the WOCAT database**
https://qcat.wocat.net/en/wocat/technologies/view/technologies_3376/
Video: https://player.vimeo.com/video/261299370

**Linked SLM data**
n.a.

**Documentation was faciliated by**

Institution
- National Agricultural Research Organisation (NARO) - Uganda

Project
- Scaling-up SLM practices by smallholder farmers (IFAD)

**Links to relevant information which is available online**

- LABLAB Lablab purpureus (L.) Sweet: https://plants.usda.gov/plantguide/pdf/pg_lapu6.pdf