

Two-year old clonal Eucalyptus give quick returns for farmers in semi-arid areas (Issa Aiga)

Fast-Growing Clonal Eucalyptus (Uganda)

Pito yen Kalituc

DESCRIPTION

Clonal eucalyptus trees (originating from South Africa) grow in northern Uganda for timber production

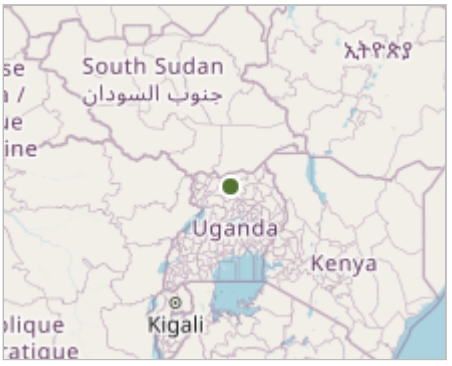
Clonal eucalyptus, commonly known as a hybrid of eucalyptus species developed by crossing various species of eucalyptus. It is fast-growing, attaining maturity for timber between 12 to15 years.

Seedlings for the eucalyptus clones are sold by various tree nursery operators in the area from where the farmers buy them. In preparation for tree planting, the land is cleared of all vegetation usually by slashing, but use of herbicides is also possible. Planting holes, measuring 30cm in diameter and depth, are dug at a spacing of 3m x 3m. Seedlings of 1-2 months age, bought from nurseries are planted in the prepared holes. Weeding is done twice a year for the first two years during which maize and beans can be intercropped with the young trees. Intercropping young trees with crops, a practice known as 'Taungya', helps to compensate for the weeding costs. Eucalyptus trees are generally self-pruning but if need arises, branches that have grown larger than 6 cm in diameter are removed using a saw. Pruning becomes necessary at the age of 3 years. At planting, the number of plants is 1,100 per hectare. Thinning is usually done at the age of 4 and 7 years, leaving about 450 plants per hectare. Protecting from animals and fire and is also done periodically by patrolling and creating fire lines in the plantation. The fire lines are created by dividing the plantation into smaller units and clearing 6-m wide strips between the units.

Farmers like the eucalyptus clones for establishing timber plantations because they grow fast and yield timber 5 to 7 years earlier than the non-hybrid species thus reducing the payback period for eucalyptus plantations. They are a source of income through the sale of poles and help in carbon sequestration which reduces the effect of climate change.

Farmers are apprehensive of this technology because the appropriate clones are difficult to locate in the tree nurseries. Secondly, some nursery operators do not tell the truth about the performance of different clones in the area. In northern Uganda, the most adaptable clone is 'GC 784', which has been observed to perform exceptionally well. The cost of the hybrid clones is 40% higher than the conventional seedlings.

LOCATION



Location: Northern, Uganda

No. of Technology sites analysed: single site

Geo-reference of selected sites:

- 32.498277, 3.128643

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

Date of implementation: 2015

Type of introduction

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



A two-tear old plantation of clonal Eucalyptus. At this height, it is about one meter taller than ordinary seedligs of the same age. (Issa Aiga)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- ☐ improve production
- ☐ prevent, reduce land degradation; restore/rehabilitate land
- ☐ 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

Purpose related to land degradation

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

SLM group

- forest plantation management

Land use



Cropland

- Annual cropping

Water supply

- ✓ rainfed
- ○ mixed rainfed-irrigated
- ○ full irrigation

Number of growing seasons per year: 2

Degradation addressed



biological degradation Bc: reduction of vegetation cover

SLM measures

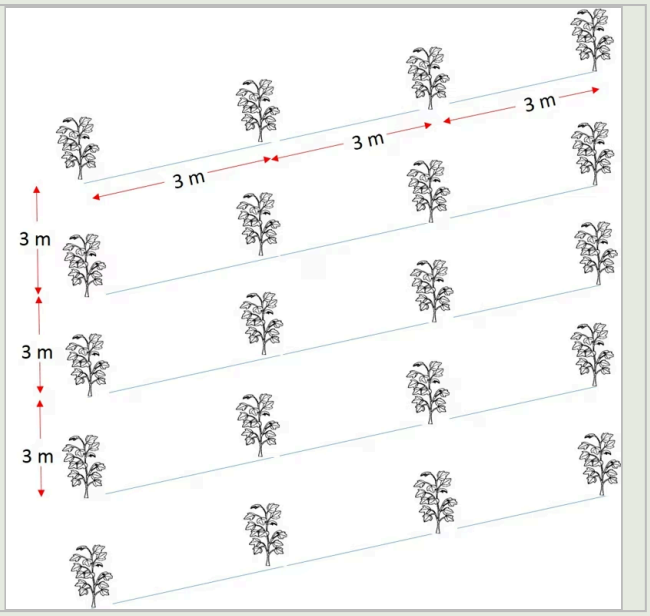


vegetative measures V3: Clearing of vegetation, V4: Replacement or removal of alien/ invasive species



management measures M3: Layout according to natural and human environment

TECHNICAL DRAWING



Author: Bernard Fungo

Spacing of 3 x 3 meters between and within rows
Panting density of 1100 tree per ha
Thinning to 450 tree per ha around year 7

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology unit (unit: **Hectares**)
- Currency used for cost calculation: **Uganda Shillings**
- Exchange rate (to USD): 1 USD = 3500 Uganda Shillings
- Average wage cost of hired labour per day: 10,000

Most important factors affecting the costs

Buying seedlings

Establishment activities

1. Land clearing
2. Liming-out and pitting
3. Planting
4. Weeding
5. Thinning

Establishment inputs and costs (per Hectares)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Land cleaing	Hactares	40	200 003.00	8 000 120.00	100
Lining-out and pitting	Hactares	40	200 000.00	8 000 000.00	100
Planting	Hactares	40	200 000.00	8 000 000.00	100
Weeding	Hactares	40	200 000.00	8 000 000.00	100
Equipment					
Thinning	Hactares	40	400 000.00	16 000 000.00	100
Plant material					
Seedlings	Number	1100	500.00	550 000.00	100
Total costs for establishment of the Technology (Uganda Shillings)				**48 550 120.00**	
Total costs for establishment of the Technology in USD				*13 871.46*	

Maintenance activities

1. Periodic Patrols (Timing/ frequency: Monthly)

Maintenance inputs and costs (per Hectares)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Patrols	Years	10	500 000.00	5 000 000.00	100
Total costs for maintenance of the Technology (Uganda Shillings)				**5 000 000.00**	
Total costs for maintenance of the Technology in USD				*1 428.57*	

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

Slope
- [ ] flat (0-2%)
- [x] 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
- [x] 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
- [ ] 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
- [ ] employee (company, government)

Gender
- [ ] women
- [x] men

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

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5 – 1 ha
- [ ] 1 – 2 ha
- [ ] 2 – 5 ha
- [ ] 5 – 15 ha
- [x] 15 – 50 ha
- [ ] 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

wood production	decreased	increased
energy generation	decreased	increased

Ecological impacts

vegetation cover	decreased	increased
biomass/ above ground C	decreased	increased

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

CLIMATE CHANGE

Climate-related extremes (disasters)

heatwave	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 %
- > 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

- Income
- Timber

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

- Eucalyptus clones have a shorter pay-back period compared to native species

Weaknesses/ disadvantages/ risks: land user's view — how to overcome

- The timber from eucalyptus clones has yet to be adequately tested for strength — Research
- Risk of fire is very high in the area. Clones are highly susceptible. — Ensure the plantation is protected from fire by use of fire lines and frequent patrols

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view — how to overcome

- Establishment cost —
- Weeding —

REFERENCES

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Resource persons
Francis Anywar - land user

Full description in the WOCAT database

https://wocat.net/en/database/technologies/2870/

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Institution
- Bern University of Applied Sciences, School of Agricultural, Forest and Food Sciences (HAFL) - Switzerland

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Key references
- N/a —

Links to relevant information which is available online
- N/a —

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