Photo showing improved tree nursery bed in Amuru District, Northern Uganda (Jalia Namakula)

Improved Tree Nursery Bed (乌干达)

Kayubu Kodi

描

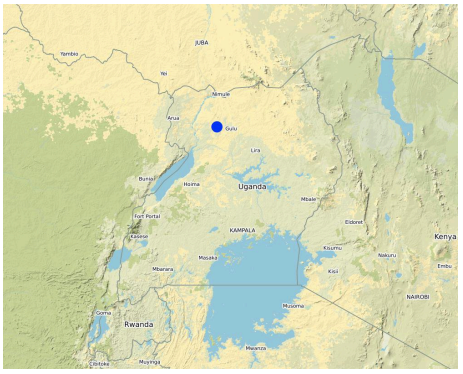
Improved fruit tree nursery is a technology comprising of grafted mangoes, grafted citrus, eucalyptus and pines, established with the aim of improving household income and promotion of agro-forestry farming systems within surrounding communities to achieve environmental conservation.

Tree nurseries are places where tree seedlings are propagated, managed, and grown to a transportable size. They are essential for producing quality seedlings in high quantities for rapid afforestation and sustainable land management.
In response to promoting this technology among farmers in Uganda, the Government of Uganda, through its initiatives such as Operation Wealth Creation (OWC), is promoting the growing of high value crops such as fruit trees to improve farmers' incomes and food security. The technology is established on a gently sloping land lying on a plot of 1725 square meters, some 300 m away from a wetland used as a source of water for the nursery during the dry season. The soils here, on observation, have high clay content and are relatively deep.

The activities for establishing the nursery involved three stages:
1. clearing the bush on site, destroying all the termite mounds, ploughing the area, and levelling the mother beds established on flat or gentle rolling area to avoid water logging during the rainy season
2. preparation of the potting area and the potting medium which was done by mixing black soil with sand and manure in a ratio of 3-1-1 respectively. These activities took 2 person days to finish, followed by potting in 5cm × 12cm potting bags, taking 10 person days. The pots were then laid in a series of 1×10m long beds with paths of 0.75m between them. This activity took 2 persons days. Seeds were planted, watered and pots were covered with grass until germination after 14 days. After germination the seedlings are left for 4 months to mature until they are ready for grafting
3. grafting the then ready root stock with desired scion. The process involves cutting the root stock and scion at an angle and fitting the two together and holding them tightly with a wide plastic thread, the grafted seedlings are then placed in beds and placed in a closed housing unit with enough humidity only to be removed after 21 days. The seedlings are now placed again in rows where they are managed until ready for transportation

Maintenance activities included spraying fortnightly with pesticides and fungicides, watering with clean water twice every week, weeding and regular sorting of the seedlings to encourage proper growth. If any shade was put it is removed when the seedlings are well established to acclimatize them to open environmental conditions before they are transplanted or sold.
The tree varieties planted include improved mangoes, citrus, clonal eucalyptus and pines. Currently the nursery has over 10,000 citrus seedlings and 15,000 mango seedlings and a few seedlings of both pine and eucalyptus.
Tree nurseries are preferred by farmers because they use small land sizes, generate a lot of income, seedlings, when planted protect the environment and help in rapid production of genetically improved fruit trees in addition to offering employment to a wide spectrum of people including unskilled and skilled persons. There are notwithstanding, challenges such as lack of reliable water source and lack of skilled labor for grafting and high nursery establishment costs.
Limited market opportunities continue to be limiting factors to the tree nursery initiatives with the government being the only big buyer of tree seedlings in North Uganda.

地点



地点: Pajak village, Amuru District, Northern Uganda, Northern Uganda, 乌干达

分析的技术场所数量: 单一场所

选定地点的地理参考
- 31.96157, 2.81253

技术传播: 均匀地分布在一个区域 (approx. < 0.1 平方千米 10 公)

实施日期: 2002

介绍类型
- 土地使用者的创新
- 作为传统系统的一 分 50 年
- 在实 /研究期
- ☑ 外 目 干

Photo showing Mango seedlings planted as root stock in Amuru District (Jalia Namakula)

技术分类

主要目的

- [x] 改良生产
- [ ] 减少、 、恢复土地 化
- [ ] 保护生态系统
- [ ] 结合其他技术保护流域/下游区域
- [ ] 保持/提 生物多样性
- [ ] 低灾害
- [ ] 应气候变化/极端天气及其影响
- [ ] 减缓气候变化及其影响
- [x] 创 有益的经济影响
- [ ] 创 有益的社会影响

土地利用

不毛之地 - 具体说明: Bush surrounded by former brick making area

供水

- [ ] 养
- [x] 混合 水灌溉
- [ ] 充分灌溉

每年的生长季节数: 1
该技术实施前的土地利用: 不 用
牲畜密度: 不 用

土地退化相关的目的

- [x] 止土地 化
- [ ] 减少土地 化
- [ ] 修复/恢复严 化的土地
- [ ] 应土地 化
- [ ] 不 用

解决的退化问题

土壤水蚀 - Wt 表土流失地表侵蚀

土壤风蚀 - Et 表土流失

生物性退化 - Bc 植被覆盖的减少

SLM组

- tree nursery

SLM措施

植物措施 - V1 乔木和灌木覆盖层

技术图纸

技术规范

The nursery is located on a 69m X 25 m (1725 m2) plot size
The nursery beds are a 1m x 10m, with a 75cm pathway between the beds
The beds contain 10,000 citrus seedlings 15,000 mango seedlings and a few clonal eucalyptus and pine trees
The pots used for growing mangoes are 5in x 7in, whereas citrus , eucalyptus and clonal are 4in X 7in
The rivets used to construct the shades are between 2m and1.5cm high. grass is used to shield the young seedlings from direct sunshine

技术建立与维护 活动、投入和费用

投入和成本的计算

- 计算的成本为 每个技术区域 尺寸和 积单位**1725 m2**
- 成本计算使用的货币 **UGX**

影响成本的最重要因素

Accessibility to quality seed, transportation of materials, drought

- 汇率： 换算为美元： 1 美元 = 3818.0 UGX
- ： 用劳工的每日平均工资成本3000/=

技术建立活动

1. Determine water source (时 / 粤une and July)
2. Mix soils with manure (时 / 粤une and July)
3. Buy planting material (seeds and potting bags) and poles for constructing shelter shelter (时 / 粤une and July)
4. Potting and planting seeds (时 / 粤une and July)
5. Cover pots with grass (时 / 粤une and July)
6. Put under shade (时 / 粤une and July)

技术建立的投入和成本 (per 1725 m2)

对投入进行具体说明	单位	数量	单位成本 (UGX)	每项投入的总成本 (UGX)	土地使用者承担的成本%
劳动力					
Potting and Planting	People	4.0	12000.0	48000.0	100.0
Arranging pots	People	1.0	50000.0	50000.0	100.0
Preparing mango seeds	people	4.0	10000.0	40000.0	100.0
					100.0
设备					
Water pump	Piece	1.0	1000000.0	1000000.0	100.0
Wheel barrow	Piece	2.0	80000.0	160000.0	100.0
Watering can	Piece	9.0	7500.0	67500.0	100.0
Potting bags	Roll	12.0	6000.0	72000.0	100.0
Water storage drum	Piece	1.0	70000.0	70000.0	100.0
植物材料					
Seeds (Eucalyptus)	Kg	5.0	30000.0	150000.0	100.0
Seeds (Pine)	Kg	10.0	10000.0	100000.0	100.0
Seeds (citrus)	Kg	4.0	60000.0	240000.0	100.0
Seeds (mangoes)	Bag	50.0	15000.0	750000.0	100.0
Cyons (mangoes)	Piece	15000.0	100.0	1500000.0	100.0
Cyons (citrus)	Piece	10000.0	20.0	200000.0	100.0
Soil	Truck	2.0	50000.0	100000.0	100.0
Sand	Truck	1.0	50000.0	50000.0	100.0
肥料和杀菌剂					
DAP	Kg	5.0	3500.0	17500.0	100.0
Liquid fertilisers	Litre	1.0	18000.0	18000.0	100.0
施工材料					
Construction poles	piece	50.0	3000.0	150000.0	100.0
Grass	piece	50.0	2500.0	125000.0	100.0
Nails	kg	3.0	1000.0	3000.0	100.0
Polythene bags (6inch)	kg	100.0	6500.0	650000.0	100.0
Polythene bags	kg	120.0	6500.0	780000.0	100.0
技术建立所需总成本				**6'341'000.0**	

技术维护活动

1. Watering (时 / 率/week)
2. Pesticides application (时 / 率/season)
3. Sorting of seedlings (时 / 率/season)
4. Construction of shades (时 / 率/season)

技术维护的投入和成本 (per 1725 m2)

对投入进行具体说明	单位	数量	单位成本 (UGX)	每项投入的总成本 (UGX)	土地使用者承担的成本%
劳动力					
Watering	People	5.0	3000.0	15000.0	100.0
Weeding	People	5.0	15000.0	75000.0	100.0
Sorting	People	5.0	1000.0	5000.0	100.0
Strings	People	2.0	8000.0	16000.0	100.0
施工材料					
Poles	Piece	50.0	1500.0	75000.0	100.0
Grass	Bundle	25.0	2500.0	62500.0	100.0
技术维护所需总成本				**248'500.0**	

自然环境

年平均降雨量

☐ < 250毫米

农业气候带

☑ 潮湿的

关于气候的规范

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

- [ ] 半湿润
- [ ] 半干旱
- [ ] 干旱

Rainfall started late. First season rains started in April instead of late March, and second season started in September instead of late August
气象站名称： Gulu meteorology station

斜坡
- [ ] 水平（ 0-2%）
- [ ] 缓（ 3-5%）
- [x] 平缓（ 6-10%）
- [ ] 滚坡（ 11-15%）
- [ ] 崎岖（ 16-30%）
- [ ] （ 峭： 31-60%）
- [ ] （ 常： 峭： >60%）

地形
- [ ] （ 高平原）
- [ ] 山脊
- [ ] 山坡
- [ ] 山地斜坡
- [x] （ 坡）
- [ ] 谷底

海拔
- [ ] 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.

……应用的技术
- [ ] 凸形情况
- [ ] 凹（ 情况）
- [x] 不相关

土壤深度
- [ ] （ 常浅： 0-20厘米）
- [ ] 浅（ 21-50厘米）
- [ ] 中等深度（ 51-80厘米）
- [x] 深（ 81-120厘米）
- [ ] （ 常深： > 120厘米）

土壤质地（表土）
- [ ] 粗粒/轻（ 砂质）
- [x] 中粒（ 壤土、粉土）
- [ ] 细粒/（ 质： 粘土）

土壤质地（地表以下>20厘米）
- [ ] 粗粒/轻（ 砂质）
- [ ] 中粒（ 壤土、粉土）
- [x] 细粒/（ 质： 粘土）

表土有机质含量
- [ ] （ 高： >3%）
- [ ] 中（ 1-3%）
- [ ] 低（ <1%）

地下水位
- [ ] 表（ 上）
- [x] < 5米
- [ ] 5-50米
- [ ] > 50米

地表水的可用性
- [ ] （ ）
- [x] 好
- [ ] 中等
- [ ] 匮乏/没有

水质（未处理）
- [x] 良好（ 用水）
- [ ] 不良（ 用水）（ 要处理）
- [ ] 仅供农业使用（ 灌溉）
- [ ] 不可用

盐度是个问题吗？
- [ ] 是
- [x] 否

洪水发生
- [ ] 是
- [x] 否

物种多样性
- [ ] （ ）
- [x] 中等
- [ ] 低

栖息地多样性
- [ ] （ ）
- [ ] 中等
- [x] 低

应用该技术的土地使用者的特征

市场定位
- [ ] 生计（ 自给）
- [ ] 混合（ 生计/商业）
- [x] 商业/市场

非农收入
- [x] 低于全（ 收入的0%）
- [ ] 收入的10-50%
- [ ] > 收入的50%

相对财富水平
- [ ] （ 常贫瘠）
- [ ] 贫瘠
- [ ] 平均水平
- [x] 丰富
- [ ] （ 常丰富）

机械化水平
- [ ] 手工作业
- [ ] 畜力牵引
- [x] 机械化/电动

定栖或游牧
- [x] 定栖的
- [ ] 半游牧的
- [ ] 游牧的

个人或集体
- [x] 个人/家庭
- [ ] 团体/社区
- [ ] 合作社
- [ ] 员工（ 公司、政府）

性别
- [ ] 女人
- [x] 男人

年龄
- [ ] 儿童
- [ ] （ 年人）
- [x] 中年人
- [ ] 老年人

每户使用面积
- [x] < 0.5 公
- [ ] 0.5-1 公
- [ ] 1-2 公
- [ ] 2-5公
- [ ] 5-15公
- [ ] 15-50公
- [ ] 50-100公
- [ ] 100-500公
- [ ] 500-1,000公
- [ ] 1,000-10,000公
- [ ] > 10,000公

规模
- [x] 小规模的
- [ ] 中等规模的
- [ ] 大规模的

土地所有权
- [ ] 州
- [ ] 公司
- [x] 社区/村庄
- [ ] 团体
- [ ] 个人（ 未命名）
- [ ] 个人（ 有命名）

土地使用权
- [ ] 自由（ 入） 无组织）
- [x] 社区（ 有组织）
- [ ] 租赁
- [ ] 个人

用水权
- [ ] 自由（ 入） 无组织）
- [x] 社区（ 有组织）
- [ ] 租赁
- [ ] 个人

进入服务和基础设施的通道

健康	贫瘠		✓	好
教育	贫瘠		✓	好
技术援助	贫瘠		✓	好
就业（ 例如： 农）	贫瘠	✓		好
市场	贫瘠		✓	好
能源	贫瘠	✓		好
（ 路和交）	贫瘠		✓	好
（ 用水和卫生设施）	贫瘠		✓	好
（ 融服务）	贫瘠			好

影响

社会经济影响

农业收入

增加

The farmer sold 25,000 seedlings and earned over UGX 37,500,000 (USD 9,868)

社会文化影响

生态影响

场外影响

水的可用性 地下水、泉水

增加

The water used in the dry season is drawn from the pond constructed in a wetland close. However this is affecting the water flow to other neighbours using this water.

成本效益分析

与技术建立成本相比的效益

短期回报 常积极

期回报 常积极

与技术维护成本相比的效益

短期回报 常积极

期回报 常积极

Tree nurseries are very expensive to establish and take close to a year for the seedlings to be sold. Therefore, establishment costs surpass benefits in the short run, however when the trees are sold they fetch a lot of income. Maintenance costs, both in the short and long term are positve.

气候变化

渐变气候

年温度 增加

年 减少

常好

常好

用和 应

采用该技术的地区内土地使用者的百分比

- [ ] 单例/实
- [x] 1-10%
- [ ] 10-50%
- [ ] 大于 50%

在所有采用这种技术的人当中，有多少人在没有获得物质奖励的情况下采用了这种技术?

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

最近是否对该技术进行了修改以适应不断变化的条件？

- [ ] 是
- [x] 否

什么样的变化条件？

- [ ] 气候变化/极端气候
- [ ] 不断变化的市场
- [ ] 劳动力可用性 例如 由于 移

结论和吸取的教训

长处: 土地使用者的观点

- Optimal space utilisation
- Maintenance costs are low
- Nurseries generate high value crops

长处: 编制者或其他关键资源人员的观点

- Nurseries rehabilitate degraded land
- Environmental improvements
- They are used for aesthetic benefits

弱点/缺点/风险: 土地使用者的观点如何克服

- Establishment costs are high Bulk purchases of inputs
- Grafting needs technical skills Hire skilled labour
- Markets are inaccessible Register company with the district and sub-county

弱点/缺点/风险: 编制者或其他关键资源人员的观点如何克服

- Labour intensive
- Markets are highly seasonal Sourcing from other buyers for examples NGOs promoting agro- forestry
- Trees do not grow at the same rate Application of fertilizers

参考文献

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WOCAT数据库中的完整描述
https://qcat.wocat.net/zh/wocat/technologies/view/technologies_2797/
视 ：https://player.vimeo.com/video/254834062

链接的SLM数据
不 用

文件编制者

机构
- Uganda Landcare Network (ULN) - 乌干达

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

主要参考文献
- Improving Sustainable Productivity in Farming systems and Enhanced livelihoods through Adoption of Evergreen Agriculture in Eastern Africa. Joy Buyinza and Vicent I Opolot: https://www.cgiar.org/research/publication/improving-sustainable-productivity-in-farming-systems-and-enhanced-livelihoods-through-adoption-of-evergreen-agriculture-in-eastern-africa-shortened-as-trees-for-food-security-project/

链接到网络上可用的相关信息
- Improving Sustainable Productivity in Farming systems and Enhanced livelihoods through Adoption of evergreen Agriculture in Eastern Africa: https://www.worldagroforestry.org