Agroforestry Practices

inter aide Malawi

Pruning senna spectabilis (coppicing or pollarding)

Illustration through different case studies

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1. *Senna spectabilis* hedge near the homestead

Case Study 1

Case Study

This case study was carried out in Nampite VH (Chidambayla GVH). It is based on data collected during two interviews conducted with the farmer who has planted the trees. We also measured data on biomass production the day of pollarding, in early October 2016.

Senna spectabilis hedge pollarded one year ago. Abadia C. (October 2016)

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

History

The owner, Mr. Pustani, planted his Senna spectabilis hedge in January 2006. The AEDO assisted the villagers by providing them with seeds and polytubes and by training them on setting up a common tree nursery. Mr. Pustani received seedlings and decided to plant them along a non-cultivated common land.

Establishment

He dug holes every 2 meters and added compost in each planting station. He decided to transplant the seedlings in January to ensure a good watering by rains. He did not protect the trees against goats, even during the dry season. The survival rate is very good as only two out of thirty trees have died. He decided to pollard the trees to obtain more branches. If the coppicing technique is used, goats will attack the new leaves and branches will not grow properly, therefore he preferred the pollarding technique.

Upkeep

After 1 year, he removed the additional trunks to keep only one or two of the straightest.
After 5 years, he pollarded the trees for the first time.
Every year, he pollards the trees completely in early October.
Every year, in December, he removes the smaller branches to avoid competition for nutrients and water.

Economic Value

He sells wood to people who need firewood or sticks to dry tobacco leaves. By selling all the branches of one tree, once a year, he earns an average of **600 MK**.
He owns **24 trees**, which means a potential income of **14,000 MK / year**.

Technical Characteristics

Distance between 2 trees : 2 meters.
Month of plantation : January.
Removal of additional trunks : after 1 year.
First pollard : after 5 years.
Next pollards : every year in early October.
Thinning : every year in December.

On the left, trees before pollarding.
In the middle, trees freshly pollarded.
On the right, trees two months after pollarding.
Source : Abadia C. (2016)

Data on biomass production

Sample	Trunk height (m)	Trunk circumference (m)	Trunk Volume (m^3)	Estimation of Dry Trunk weight (kg)	Number of branches	Branches weight (green wood + leaves)
1	2,30	0,47	0,040451433	19,20	22	18.5
2	1,70	0,41	0,022752389	10,93	11	17.6
3	1,65	0,54	0,038307325	18,39	16	30.6
4	2,50	0,46	0,042117834	20,22	15	18.8
5	2,60	0,29	0,017409236	8,36	10	10.6

Data on 10 years old Senna spectabilis pollarded every year. Abadia (2016)

Wood harvesting, early October 2016. Abadia (2016)

Heap of branches from one tree.
Marketable value in the village : 600 MK.

Model Farmer Contact

Name : Mr. Pustani
VH : Nampite
GVH : Chidambayla
APC Member : No

2. Row of *Senna spectabilis* along a cropland

Case Study 2

Case Study

This case study was carried out in Chinjala VH. We conducted two interviews with the farmer and we collected field data.

Cassia (*Senna spectabilis*)
Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

Senna spectabilis hedge around a cassava field. Abadia C. (October 2016)

History

In 2011, the farmer planted his Senna spectabilis on the side of a two-acres field. He is a member of Kasupe APC and the seedlings come from the common nursery.

Establishment

He planted his trees every 1,3 meters on average on a total distance of 30 meters. He did not add compost to the planting stations. Despite the fact that he did not protect the trees against goats (even during the dry season) the survival rate is high (75%). He pollarded the trees in order to harvest poles and uses them to build new fences.

Upkeep

After 3 years, he pollarded the trees for the first time in December.
Every 2 years, he pollards the trees in December.

Mixed live/dry fence

He built the dry fence around the field by himself in January 2016, when he planted cassava. It is made with bamboo stems and blue gum poles. The dry fence is fixed directly on the tree trunks.

Costs

For a length of 30m, the dry fence costed 2000 MK for bamboo and 1500 MK for wood poles, or 3500 MK in total. He will remove the fence after the harvest as it will otherwise be damaged by rains and termites. He will use the bamboo as fuelwood.

Technical Characteristics

Distance between 2 trees : 1,3 meters
First pollard : after 3 years
Next pollards : every 2 years in early December

Senna spectabilis and bamboo fence.
Source : Abadia C. (June 2016)

Data on trees dimensions

Sample	Height (m)	Circumference (m)	Trunk volume (m^3)	Estimation of dry trunk weight (kg)
1	1,80	0,24	0,009	3,97
2	2,10	0,30	0,015	7,23
3	1,90	0,25	0,009	4,54
4	2,40	0,30	0,018	8,26

Model Farmer Contact

Name : Unknown
VH : Chindjala
GVH : Chindjala
APC Member : Yes

3. Row of *Senna spectabilis* near the homestead

Case Study 3

Case Study

This case study was carried out in Mlinga VH. It is based on data collected during an interview conducted with the owner in October 2016.

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

Row of Senna spectabilis in Mlinga VH. Abadia (October 2016)

History

The farmer planted her *Senna spectabilis* in December 2006. At the time, she was member of a club supported by Inter Aide and she received her seedlings from the common tree nursery.

Establishment

She dug a hole every meter and she transplanted her seedlings by the end of December without adding any organic or chemical fertilizers.
She did not protect her trees because according to her, goats do not eat Senna spectabilis.
She chose to pollard the trees because if they are cut at the bottom, children break the young shoots and the trees cannot grow properly.

Upkeep

After 2 years, she pollarded the trees for the first time (in September).
Every year, she pollards the trees completely by the end of September or early October.
The branches of Senna spectabilis are thin therefore they take only 3 days to be dried (or only one if you remove the bark).

Economic Value

The wood is mainly sold for timber and firewood.
This year, with 14 trees:
She earned 10,000 MK by selling timber.
She earned 8,700 MK by selling firewood.
She kept enough firewood to be self-sufficient during 2 months.

Technical Characteristics

Distance between 2 trees : 1 meter
Month of plantation : by the end of December
First pollard : after 2 years
Next pollards : every year in September - October

Row of *Senna spectabilis* in Mlinga VH. Abadia (October 2016)

4. Row of *Senna spectabilis* all around the field

Case Study 4

Case Study

This case study was carried out in Khombe GVH. It is based on data collected during an interview conducted with the owner of the field.

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

Row of Senna spectabilis. Abadia (October 2016)

History

Mr. Benja Sositengaleta planted his hedge of *Senna spectabilis* with the support of Inter Aide. He transplanted approximately 300 seedlings in December 2014. He considers this field as an "experimentation" because he does not have any knowledge on tree plantation. He decided to fence all of his field with the trees for several reasons :

- To support the dry fence when he grows cassava.
- To make manure in the field thanks to leaf fall.
- Not enough space to plant them elsewhere.
- He is thinking about moving from Mitundu to Chiwala and build his house on this plot. Trees will provide shade and windbreak for his future homestead.

Establishment

He dug holes every meter and planted trees without manure. At this time, he had cassava in the field so he planted the trees inside the fence to protect them against goats.
Only 6 or 7 trees died but he did not replace them.

Upkeep

Until now, he has pruned only some trees because they are too young to give firewood or timber. He is going to prune all of them in April 2017. Then, he thinks he will prune the trees every two years. He will pollard a part of them and prune the other part because he does not really know which technique is the best. To complete the first partial pruning, it took him 2 days.

Economic Value

He does not think about selling wood, it is just for his own consumption.

Technical Characteristics

Distance between 2 trees : 1 meter
Density : approximately 300 trees in 2 acres
Month of plantation : December
First pollard : after 3 years
Next pollards : every two years

Two years old Senna spectabilis . Abadia (2016)

Model Farmer Contact

Name : Mr. Benja Sositengaleta
VH : Khombe
GVH : Khombe
APC Member : Yes
Note : He is Khombe GVH's brother

5. Senna spectabilis hedge near the homestead

Case Study 5

Case Study

This case study was carried out in VH Maluwa. It is based on data collected during an interview conducted with the owner of the field.

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

Senna spectabilis hedge in Maluwa. Abadia (October 2016)

History

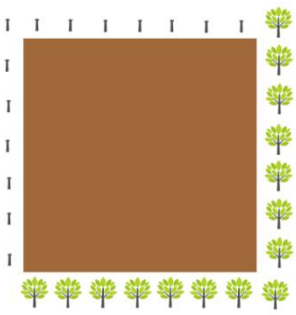
The owner, Mr. Chinkunda, planted his *Senna spectabilis* hedge more then 10 years ago. At this time, he regularly went to Lilongwe for business and he saw a big Senna spectabilis with plenty of yellow flowers. He collected some seeds from this tree in order to plant them along his cropland with an ornamental purpose. After a few years, the 4 trees obtained from this plantation started to give seeds and he collected them in order to surround his field with Senna spectabilis for firewood.

Establishment

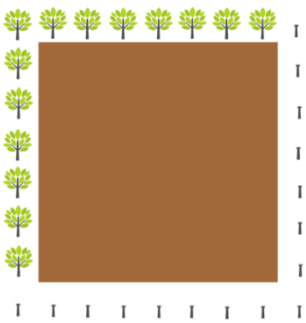
Mr. Chinkunda made a nursery in his dimba where he planted seeds directly on a seed bed, without treatment and without using polytubes. He transplanted the seedlings with the idea of entirely enclosing his field. Unfortunately, his neighbour, worried that these trees could compete with her maize and decrease yields, removed the trees which were located along her plot. The other trees had a good survival rate even if he did not protect them. At this time they had few goats in the village and goats do not eat leaves of Senna spectabilis.
The next year, Mr. Chinkunda replaced the trees which were destroyed by his neighbour to finish the fence. According to him, Senna spectabilis can compete with crops but if they are regularly pollarded then there is no problem.
The density is not regular, the space between 2 trees varies from 1 to 2,5 m.

Upkeep

He does not exactly remember when he pollarded his trees for the 1st time but he said that they were already tall (we can assume 5 years after plantation). He pollarded his trees at 1,50 metres high to facilitate the upkeep (he does not need to use a ladder or to climb to cut branches). This pruning technique enables him to harvest more fuelwood than if he had let the tree grow naturally. However, when a tree is pollarded all branches must be removed as otherwise the tree will not grow new long branches.
Now he pollards them every two years (1 year he pollards two sides and the next year the two other ones) between October and December.
He did not remove the additional shoots so some trees have two or three trunks.



Pollarding in 1st year



Pollarding in 2nd year

Economic Value

He sells firewood already dry and cut in pieces. He sells it during the rainy season but he does not know exactly how much he can earn with this business. Each piece is 40cm long and he sells it for 40 MK so if the branch measures 4m, he can earn 400 MK per branch. At a rate of 6 branches per tree, he can earn in average 2400 MK/tree every two year.

Technical Characteristics

Distance between 2 trees : 1 to 2,5 meters
Pollarding : every two year between October and December.
Height of pollard: 1,5 meters

Model Farmer Contact

Name : Mr. Chinkunda
VH : Maluwa
GVH : Maluwa
APC Member : No (but his wife)

6. Senna spectabilis hedge coppiced at the bottom

Case Study 6

Case Study

This case study was carried out in Malimbwe GVH. It is based on data collected during an interview conducted with the owner of the field.

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*
Local name : Keisha wa maluwa
Family : Leguminosae
Sub-family : Caesalpinoideae

Senna spectabilis coppiced at the bottom. Abadia (November 2016)

History

The owner planted his Senna spectabilis hedge in 2004. He bought the seedlings (1 seedling = 20 MK) and he decided to plant them along his field due to a lack of space.

Establishment

He did not plant his seedlings at a regular gap, therefore the distance between them varies from 70 centimetres to 2 meters. He did not add manure and he did not protect the trees against goats. He only chased them away when they entered the field.

Upkeep

After 3 years, he coppiced the trees at the bottom for the first time. He cut the trunk 50cm above the ground. At first, he wanted to pollard the trees but he needed money so he decided to cut them at the bottom to sell the trunks. It was not really a choice.
Every two years, he coppices the trees at 50cm above the ground. He does not do it at a specific time but instead cuts them to sell firewood whenever he needs money.

Economic Value

The owner does not keep wood for his own consumption. Every two years, he sells the branches of all his trees (one tree = 1000 MK). The buyer has to cut the branches by himself. He has 46 trees, meaning he earns 46 000 MK every two years (23 000 MK/year) thanks to his trees.
He thinks he could have more firewood if the trees were pollarded and not coppiced.
For him, selling firewood is a solution to earn money quickly when he has an unexpected expense. He does not have livestock so he considers his trees as an alternative to find cash.

His sister in law planted *Senna spectabilis* in 1994. She received seeds from the AEDO. She did not protect the trees against goats. She prunes her trees every two years between December and February to sell firewood (50cm above the ground). She uses this money to buy food during the hunger gap. She prunes her trees at the bottom to obtain timber. She can earn 3000 MK/tree by selling all the branches.
If she uses branches from one tree for firewood, she thinks she can have enough firewood for one or two weeks.
To avoid competition with maize crops, she prunes branches which are inside the field.