

Principle

Planting a row of *Senna spectabilis* offers several benefits. With this plantation model, the farmer combines the positive impacts provided by trees (windbreak, manure, firewood, timber, etc.) while reducing travel time to fetch fuel for cooking and saving money on firewood purchase.

Senna spectabilis is a relevant species to promote in order to improve rural households' wood supply. It is a fast growing species with a good survival rate in Lilongwe rural areas. Moreover, *Senna spectabilis* has good pruning qualities. Therefore, a well-managed tree is able to provide firewood and poles every year.

Cassia (*Senna spectabilis*)

Scientific name : *Senna spectabilis*

Local name : Keisha wa maluwa

Family : Leguminosae

Sub-family : Caesalpinoideae

Uses : fuelwood, timber, shade, windbreak, manure, boundary markers between fields.

Growth speed : fast

Characteristics : wood is termite-resistant

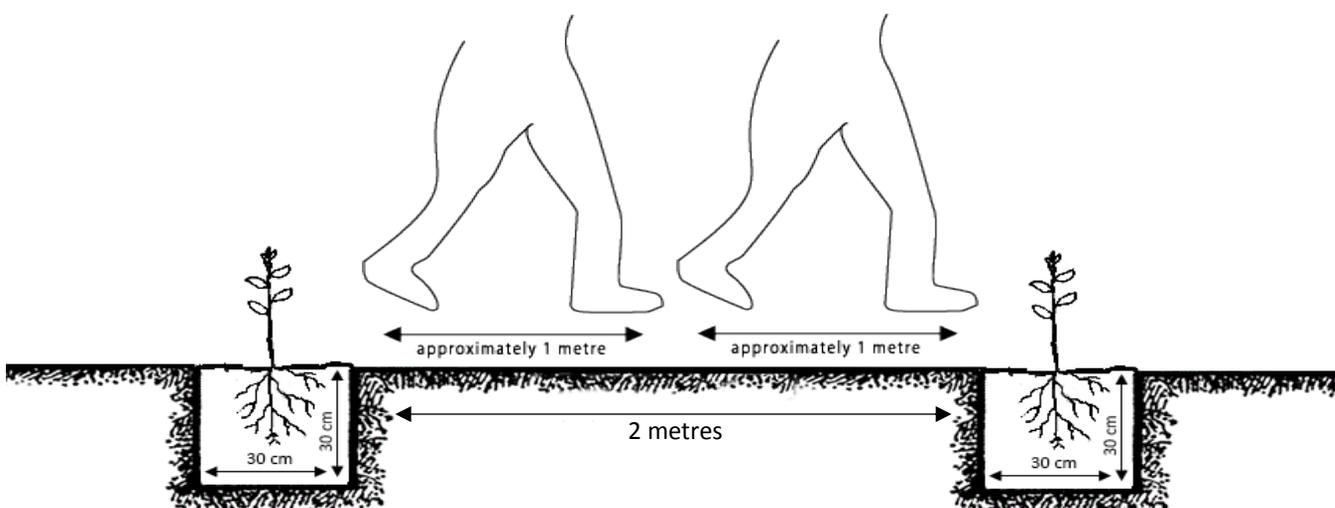


Mr Pustani's 10 years old *Senna spectabilis* in Nampite village (Chidambayla GVH). Abadia (2016)

Establishment

To ensure the proper growth of trees, there are several rules to respect :

- *Senna spectabilis* has to be sown in nurseries at the start of October.
- *Senna spectabilis* has to be transplanted in **December** or **January**, according to rains.
- Dimensions of planting stations have to be **30 cm deep with a 30 cm diameter**. Addition of manure is highly recommended in case of infertile soil.
- The plant spacing should be **no smaller than 2 metres**.



- *Senna spectabilis* is typically multi-trunked (Gilman & al. , 1994). In order to boost timber production, remove the additional shoots **1 year after plantation**. Keep only one or two of the straightest shoots.

Protection

Even if *Senna spectabilis* has a low palatability, it should at least be protected with goat dung. While livestock will not eat the leaves, it may scratch itself against the trees and damage the bark, which acts as the trees' natural protection. It is recommended to also build individual dry fences around each tree as an additional protection. *Senna spectabilis* has to be protected during at least two dry seasons.

1st Year		2nd Year	
Rainy S.	Dry S.	Rainy S.	Dry S.
	Protection		Protection

↑
Dec. – Jan.
Tree Plantation

For more information about tree protection, refer to **Guidelines for Tree Protection**.



Senna spectabilis protected with a bamboo fence. Abadia (2016)

Location of trees

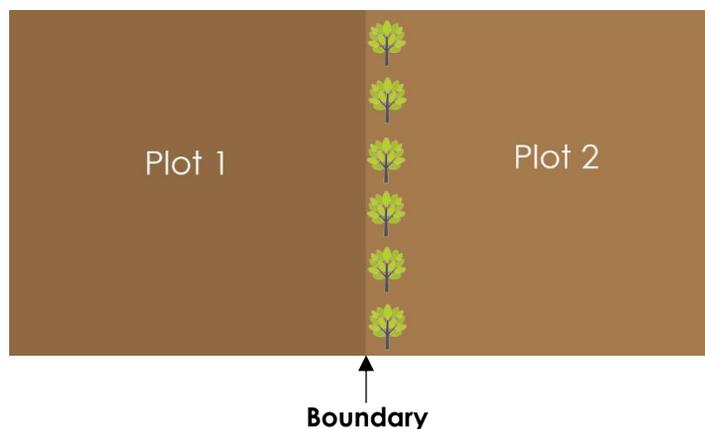
Before planting the trees, it is necessary to think about the best location. *Senna spectabilis* can be planted :

- ✓ Near the homestead, for shade, windbreak and easy access to firewood.
- ✓ On the cropland boundaries, for windbreak, manure and to support the fence around cassava.
- ✓ Scattered inside the plot, for manure and to avoid conflict with neighbours.

Plantation inside the plot :

It is important to regularly prune trees to avoid competition with crops.

Before planting trees on plot boundaries, the farmer has to inform the owner of the neighbouring field to avoid conflicts. He has to plant the trees inside his plot and not directly on the boundary.



Farmers who grow cassava should plant their trees around or inside the plot where they are going to plant cassava that year. This way, trees will be protected along with the cassava by the fence built around the plot.

Pruning

Senna spectabilis has a high faculty for resprouting after intensive and frequent prunings.

This ability is very interesting for farmers looking for firewood and timber for light construction. By using good pruning practices, it is possible to harvest wood every year without cutting trees.

Pruning Technics

Pollarding

This technique consists in removing all branches as well as the top part of a tree in order to stimulate growth of the canopy. This type of pruning presents several advantages :

- Avoid damages by animals and children.
- Increase the production of wooden biomass compared to a non-pruned *Senna spectabilis*.
- Improve the quality of timber (long and straight poles).
- Avoid shade and competition with crops nearby.

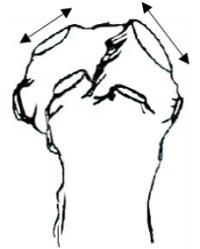


Trees pollarded along a cropland. Figure adapted from Tengnas B. (1994)

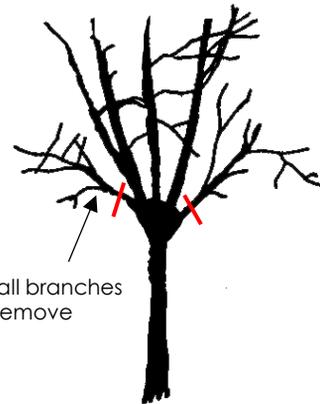
Production of timber : the top of the tree should be cut as tall as possible to keep a marketable trunk. The tree can be pollarded for the 1st time **5 years after plantation**. Then, the pollarding interval should be at the very least **every 2 years** to boost the production of trunk wood and thick branches.

Production of firewood : it is better to pollard the tree at a height of **1,5 – 2 meters** to facilitate access to branches. The tree can be pollarded for the 1st time **3 years after plantation**. Then, the tree can be pollarded **every year** or **every 2 years**.

- ✓ For both purposes (firewood and timber), *Senna spectabilis* has to be pollarded in **October (it is important in order to avoid shade on crops)**.
- ✓ Branches have to be cut in **bevel** to prevent rainwater from entering the trunk.
- ✓ Two months after the pollarding, remove the smaller shoots to avoid competition for nutrients and water. Keep a good amount of shoots according to the desired size of branches (6 to 20 branches/tree).



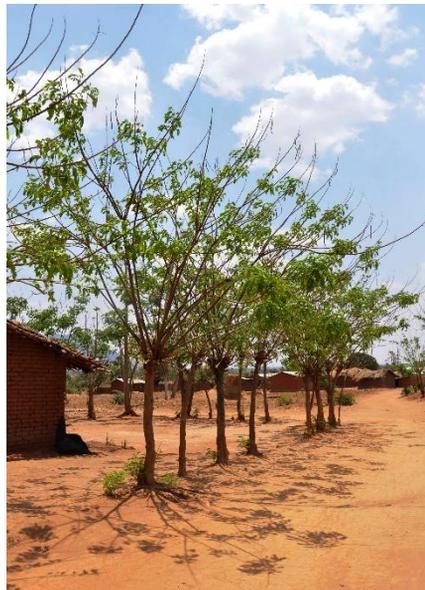
Branches cut in bevel



Small branches to remove



5 years old *Senna spectabilis* never pruned. Abadia (2016)

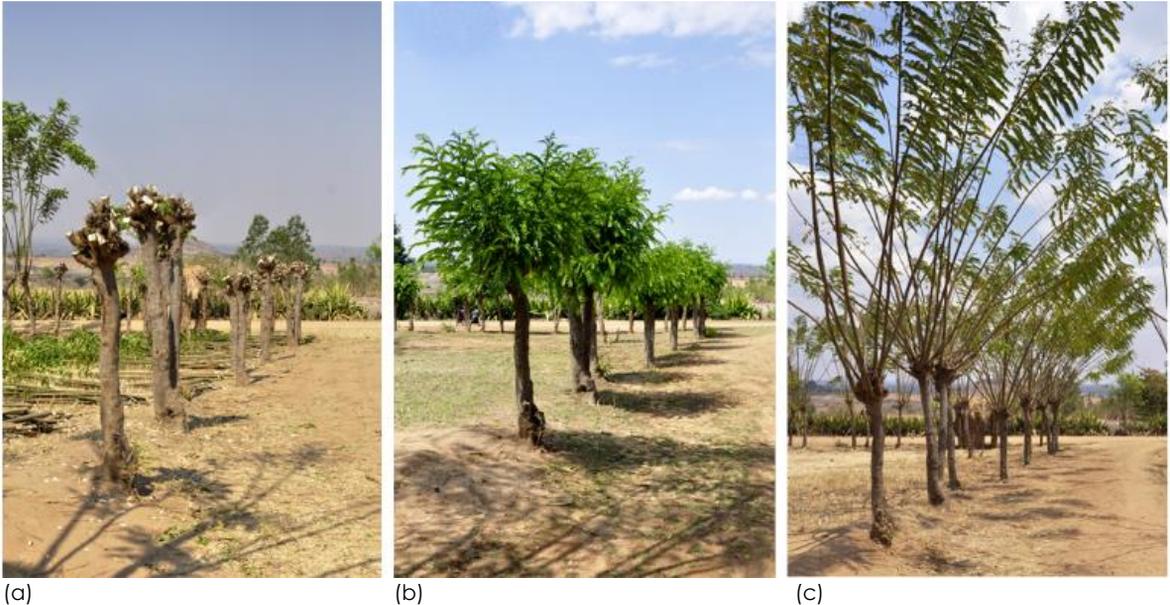


5 years old *Senna spectabilis* pollarded every year. Abadia (2016)

Economic value

According to measures taken in Nampite VH on 10 years old trees, well-pollarded *Senna spectabilis* are able to give **10 to 25 kg of dry wood every year (mean = 13,5 kg/tree)**.

According to surveys conducted in TA Chadza, a farmer who pollards his trees can earn between **500 and 1,000 MK/tree/year** (by selling all the branches). This amount depends on the number of branches and their quality. Straight and long poles for timber will be sold at a higher price than small branches for firewood.



(a) *Senna spectabilis* in Nampite village. (a) Freshly pollarded. (b) 1 month after pollarding. (c) 1 year after pollarding. Abadia (2016)

Use of leaves

After pruning, if trees are along a cropland, remove the leaves or let the branches dry in the field to make manure.

If trees are near the homestead, add dry leaves to the backyard pit in order to make compost.

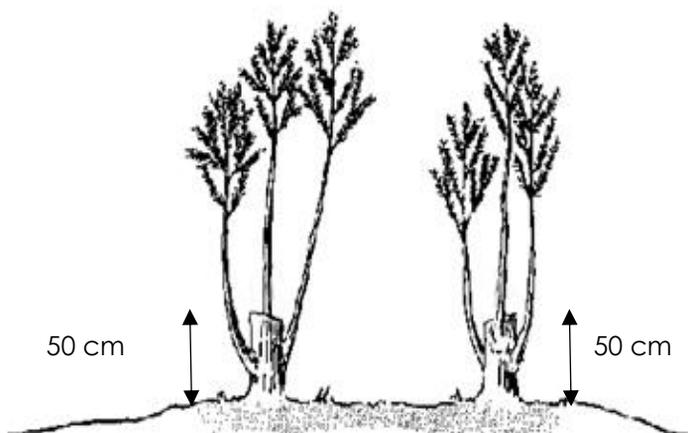
Coppicing

Coppicing consists in cutting down a tree in order to boost the growth of new shoots. Usually, this technique is preferred for timber production because poles are longer than with pollarding. It is also a good option for firewood production depending on the household situation.

Example 1 : elder people : harvest of firewood is easier when branches are on ground level.

Example 2 : household needing money quickly. The farmer can cut his trees to sell timber while keeping a source of firewood for the next years. Trees are a solution to save money.

Remarks : Be sure to protect the trees as their ground-level height makes them accessible to goats and children may be liable to break young shoots, which could prevent regrowth.



Coppiced tree. Figure adapted from Tengnas B. (1994)

Production of timber : The tree can be coppiced for the first time **2 to 3 years after plantation**. Then, the coppicing interval should be **every 2 years** to boost the production of thick and long branches.

Production of firewood : The tree can be coppiced for the first time **2 to 3 years after plantation**. Then, the tree can be coppiced **every year**.

- ✓ In both cases, *Senna spectabilis* has to be coppiced in **October / November**. This is the good time to coppice trees for two reasons : to avoid shade on maize if trees are planted inside or along plots and to allow firewood to dry before the rainy season. Some branches can be kept and cut in March for tobacco growers in need of sticks to dry tobacco leaves.
- ✓ For the first coppicing, cut the trunk at **50cm high** to ensure a proper regrowth. Then, for each of the following coppicing, **remove all the branches**.
- ✓ **2 months** after the coppicing (**December – January**), remove the smaller and twisted branches to avoid competition for nutrients and water. Keep a good amount of shoots according to the desired size of branches (6 to 20 branches/tree).



Row of *Senna spectabilis* coppiced a year ago. Abadia (2016)



Senna coppiced two years ago. Abadia (2016)

Economic Value

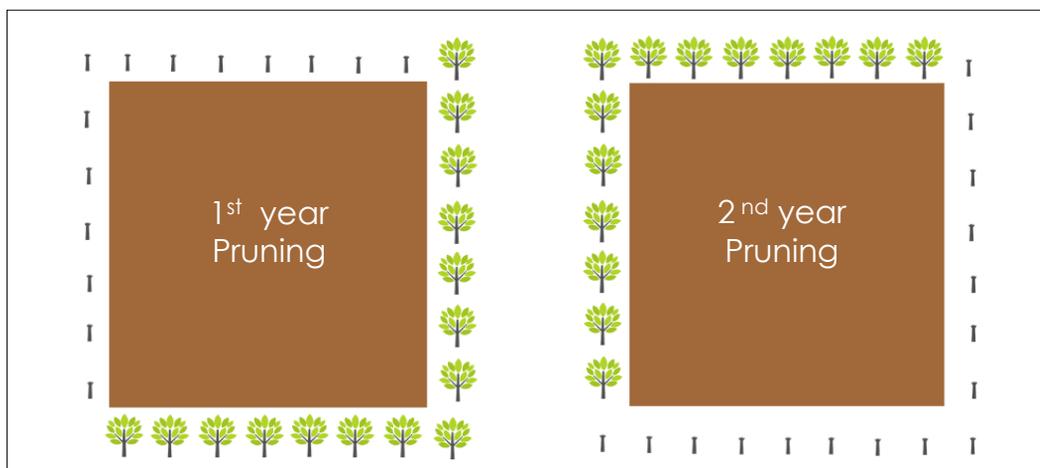
The demand for *Senna spectabilis* is high in the area. This wood is easily marketable for firewood and timber for light construction, especially in October – November when demand for firewood is high. Tobacco growers are also looking for long sticks to dry tobacco leaves in March.

According to surveys conducted in TA Chadza, a farmer who coppices his trees can earn between **500 and 2,000 MK/tree/year** (by selling all the branches). The selling price can be higher than with the pollarding technique because sticks are longer. Straight and long poles for timber will be sold at a higher price than small branches for firewood.

Alternate Pruning (valid for pollarding and coppicing)

In order to limit competition with crops and keep a reserve of wood in case of an unforeseen need of money, it is judicious to adopt an alternate pruning plan. By pruning trees every two years, the farmer can earn the same amount of money (500 to 2,000 MK/tree/year) because branches are bigger and generally sold to a higher price.

Sides Alternation



Trees Alternation



Theoretical Model for a row of *Senna spectabilis* around a plot (spacing between each tree : 2 metres)

Area (acres)	Area (m ²)	Perimeter	Number of trees (spacing 2m)	Potential benefits per year (MK)*
1	4,046	254.4	128	64,000 to 128,000
0.5	2,023	180	90	45,000 to 90,000
0.2	800	112.8	56	28,000 to 56,000

* Estimation based on a potential profit of 500 to 1,000 MK/tree/year (or 1,000 to 2,000 MK/tree every two years in case of alternate pruning).

Conclusion

There are still few people with a real management plan for their trees and studies about the economic profit of wood production are scarce in the study area.

Nevertheless, Malawi is facing a major challenge concerning households' wood supply and prices have not stopped increasing for years. It is important that our beneficiaries become self-sufficient in firewood, which may be done following these plantation models.

Bibliography

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Gilman E.F, Watson D.G (1994) "Senna spectabilis". Institute of Food and Agricultural Sciences, University of Florida. Retrieved from [http://hort.ufl.edu/database/documents/pdf/tree_fact_sheets/senspea.pdf]

Tengnas B. (1994) "Agroforestry extension manual for Kenya." Nairobi: International Centre for Research in Agroforestry. 188p.

Photo Gallery – Case Studies in TA Chadza – Abadia (2016)

