



The fast-track pathway to save the remaining forests

By OmniVerdi, Pieter Vranckx, march 2022

Growing small legume shrubs on degraded farmland

- a carbon-negative cooking fuel and an animal feed can be harvested yearly by pruning the shrubs.
- the first harvest is already possible a few months after sowing the shrubs.
- degraded soils are rehabilitated over time as roots and stems remain untouched improving the soil structure and fertility, accumulating organic matter in the soil, restoring the water absorption and retention capacities, replenishing groundwater reservoirs, avoiding erosion and downstream losses.
- scale-up to required level possible as vastly enough degraded farmland is currently available and in urgent need of rehabilitation.
- easy transformation of the pruned shrub twigs into cooking fuel by small sized community level machines. Twigs are chipped and separated in 2 fractions; the woody twig pieces for cooking fuel and the leaves for animal feed. No compaction/densification is required into briquettes or pellets as the short pieces of chipped twigs are already an excellent fuel if burned in a rocket stove.

Degraded land

Several 10s of millions of hectares in Madagascar only.



Legume shrubs



In each region there are several legume shrub local species to be found on such land trying to recolonise naturally the land. These species are to be used primarily within a mix with other species. Seeds can be collected from currently existing sparse individuals and sown directly before the rainy season to boost the population density of these shrubs in the area.

Growing small shrubs of less than 1,5m high on community land is well accepted by the communities as the ability to see far around the village is not obstructed, as would be the case with tree planting.

Year after year some additional sowing is done to achieve the density of more than 2 shrubs per square meter, being over 20 000 shrubs per hectare. Most species are fire-resistant, meaning they will resprout by themselves after an eventual unwanted bush fire.



Each year after the shrubs produced seeds the twigs are pruned at 20cm above ground level.

Twigs are left a few days in the field to dry. The dried leaves are collected at field level by beating the twigs at a clean spot. The leafless twigs can be chipped at field level too to lower the volume to be transported. The chipping machines can be carried by 2 people and run on gasoline. Purely manually chipping could be done but the daily production per person would be too little to ensure the low end price of the cooking fuel.



Carbon negative cooking fuel

The resulting 2 fractions:



The chipped twigs are 320kg/m^3 , which is a fairly good bulk density for a cooking fuel. The presence of thin stem pieces makes it easy to light and the majority of thicker stem pieces makes it burn longer and hotter. Once ignited the intensity of the fire can be controlled by adjusting the air inlet of the rocketstove. This fuel could be made available at around 350 Ar/kg final customers price.



Some examples of rocket cooking stoves that can burn loose biomass like these chipped twigs. Affordable versions should be designed by local entrepreneurs according to local cooking preferences. Clay versions are possible too, which could be built and maintained by the end users themselves at nearly zero financial cost.

Animal feed

The dried leaves are an excellent animal feed, especially when the species that are grown are well selected on their palatability and digestibility of their leaves. Selecting the animals to breed is also crucial, highly recommended are insects such as the Yellow Mealworm and several cricket species for human consumption and the Black Soldierfly for fishfeed.



Biomass harvests

Initially the harvest per hectare will not surpass a few 100kg, then it should increase yearly until the optimal shrub density is established, yielding over 2000kg dry shrub twigs per hectare per year for instance in the Ithorombe area. In more humid regions it could surpass even 5000kg.

For the dried leaves it is expected to have over 500kg/Ha/year available, and the feed conversion ratio on a dry basis lies around 10, resulting in about 50kg nutritious food high in protein and vitamins.

Protect the remaining forests much faster

Applying this approach of growing shrubs to produce cooking fuel can deliver far much faster positive results to protect the remaining forests than if trees would be planted to be harvested after 8 to 15 years for charcoal and/or firewood.

- Mainly because establishing these shrubs by direct seeding and grow them for a few months to harvest is much more guaranteed to be successful than trying to establish trees by planting seedlings or seed and grow+protect them for almost a decade before harvest.
- On the contrary with trees, an eventual unwanted bush fire would not destroy the yearly shrub harvest, as twigs are harvested before each dry season and most of the plants reserves are stored underground.
- A much larger area can be initiated yearly with the same available resources, as direct seeding of such shrubs is 10 to 50x cheaper than planting seedlings.
- Much more land is available for this approach as many communities are afraid to plant trees due to security reasons and possible ownerships questions later on. In the case of the shrubs they accept planting them as it is seen as a temporary crop of which the ownership is clear and these short shrubs do not obstruct the overview of the surroundings.

OmniVerdi

The company supplies the required machinery for chipping the shrub twigs at very affordable prices. Several models and sizes are available since february 2022.

OmniVerdi initiated this approach in Atsimo-Andrefana and Ihorombe in 2020. For each micro region and soil types several appropriated legume shrub species have been identified. The search for new species continues in other regions aswell. For some of those species several millions of seeds were collected.

In Sakaraha about 50 Ha were sown directly during the rainy season of early 2022. Sadly due to some local political problems the collected seeds in the Isalo region could not be purchased yet from the collectors and distributed amongst 300 farmers before the last rainy season.

Lateron 2022 OmniVerdi will also supply the rocket cooking stoves for this fuel.

Partners

OmniVerdi strongly recommends all institutions to apply this approach in their region. Shift the focus of planting exotic trees for charcoal to planting endemic trees to reconnect fragments of natural forest. Shift the focus on trying to obtain charcoal in maybe 10 years to having actual cooking fuel available within the year. Abandon the desire to compact biomass into briquettes or carbonize it, and adopt clean cooking stoves that can use loose uncarbonized biomass as fuel. Adopt direct sowing as a practical cheap method of establishing shrubs and trees, certainly not by throwing them out of drones, but by actually planting the seeds by hand in small planting holes.

Most land that is rehabilitated using this approach with shrubs should evolve over time into either natural forest, or production forest for timber or agricultural production land through agroforestry. Madagascar could become self-sufficient on edible oils if Moringa is planted in consortium with the legume shrubs on about 800 000 hectares.

It is of paramount importance to reach the required scale within 5 years to be able to put a nationwide moratorium on charcoal production and commercial fuel wood extraction for at least 20 years, to offer the natural forest a well needed breathing pause before even more species becomes extinct.

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