Silvopasture in Martinique: a lever to promote carbon neutral local energy and mitigate forage shortage in a climate change context

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Introduction
Today more than 93% of the electricity in the Martinique Island (French West Indies) is produced from fossil fuels. The regional scheme for the implementation of the French law on energy transition for green growth, which is part of the French commitment in the 2015 Paris agreement, targets 50% of renewable sources for power generation in 2020. The new 36.5 MW power plant GALION 2 project, under construction, will supply from 2017 15% of the electricity needs of the island, and all the energy needed by the nearby sugar plant, only from biomass combustion. The promoter, Albioma, has committed itself to incorporate about 150,000 tons of local feedstock per year.

As none energy biomass market exists in Martinique, Albioma has launched various studies to evaluate the opportunities of sourcing biomass from residues, forest and various agricultural sectors.

Martinique is a limited territory where human activities and needs have to coexist with an unique environment in a context of awareness of social and environmental responsibility. The biomass production schemes to be developed will have to consider the current practices and, as much as possible, seek for positive synergies. Due to the climate change context, animal production is facing increasing problems of forage sufficiency in the dry season.

An Albioma’s study in progress is devoted to the assessment of pre-working trials for silvopasture schemes, to match the combined objectives of improvement of animal production and of making value of the ligneous biomass.

Material and Method

Analyzing the local constraints

Martinique is an 1,100 km² island
- Limited land area
- Volcanic island → rugged terrain
- Tropical context: 34°N, 61°W
- Two seasons (rainy/dry)
- Decrease of farming area in favor of urbanization → priority to food crop and livestock
- Biodiversity hot spot → vegetal and animal introduction is limited
- EU laws application → environmental restrictions higher than other tropical territories

Assessing potential for silvopasture by analyzing land distribution in Martinique

Evaluating the actual land destination and which schemes can fit to the current agro-systems established:
- Pastures → most on the south side (dry area)
- Sugar cane covers less than 40% making mechanization possible → 5,550 ha identified
- Pos 3,000 ha of non productive fallow land → silvopasture as an opportunity to take this land back to production.

Finding land for testing models in Martinique and involve farmers

Finding motivated farmers who want to convert their land to a double production system: food and energy biomass. Analysis of their current systems:
- Cattle density: low
- Rotation frequency of livestock on pastures: low
- Food supplements brought: high
- Selling weight: low
- Making up a model to improve the current conditions → Creating a new paradigm

Selecting vegetal species

Several species are highly productive tree species for both biomass and forage

- Non invasive species
  - Acacia nilotica
  - Eucalyptus
- Local/Endemic species chosen:
  - Cordia auriculata
  - Acrostichum aureum
  - Guazuma ulei
  - Inga imbe

Taking a leaf out of Caribbean examples of biomass production integrated into food production
- Colombia
- Costa Rica
- Dominican Republic
- Several productive models identified to integrate biomass production into food crop production

Drawing the silvopastoral models

By gathering a Scientist Committee made of:
- Local experts: Agriculture Chamber, IKARE, SIMA
- National experts: IDELE, INRA, CIRAD
- International experts: CATIE (Costa Rica)
- Plus a participative working group in association with farmers representatives

Validating the silvopastoral models

By converting the plots

March 30th: Land preparation and models planting
April 2nd: General Committee for models validation
May 5th: Project manager consultation
August 20th: Land preparation
September 20th: Plantation

Discussion

The trials would give first usable data on livestock system after one year of implementation, and on biomass production between the third and the fourth anniversary of the plantation.

The success of these silvopastoral trials directly relies on the economic viability of the biomass finally produced to supply the power plant, including the whole supply-chain: plantation, maintenance, harvest and transport. But it also relies on the positive impacts on the livestock production system: higher daily weight gain, less supplementation bought, higher livestock density. The intensification provided by the model may solve the issues that faced cattle breeders such as lack of land or expensive clearing authorization procedures.

Finally, in this logical integration of energy biomass to current agro-systems, the need of a feedstock generation by Albioma should create a magnet effect on the territory that would be beneficial to all agriculture sectors, provided the concerned sectors themselves seize the issue to come.