

# Agroecology Highlights

International Center for Tropical Agriculture (CIAT)

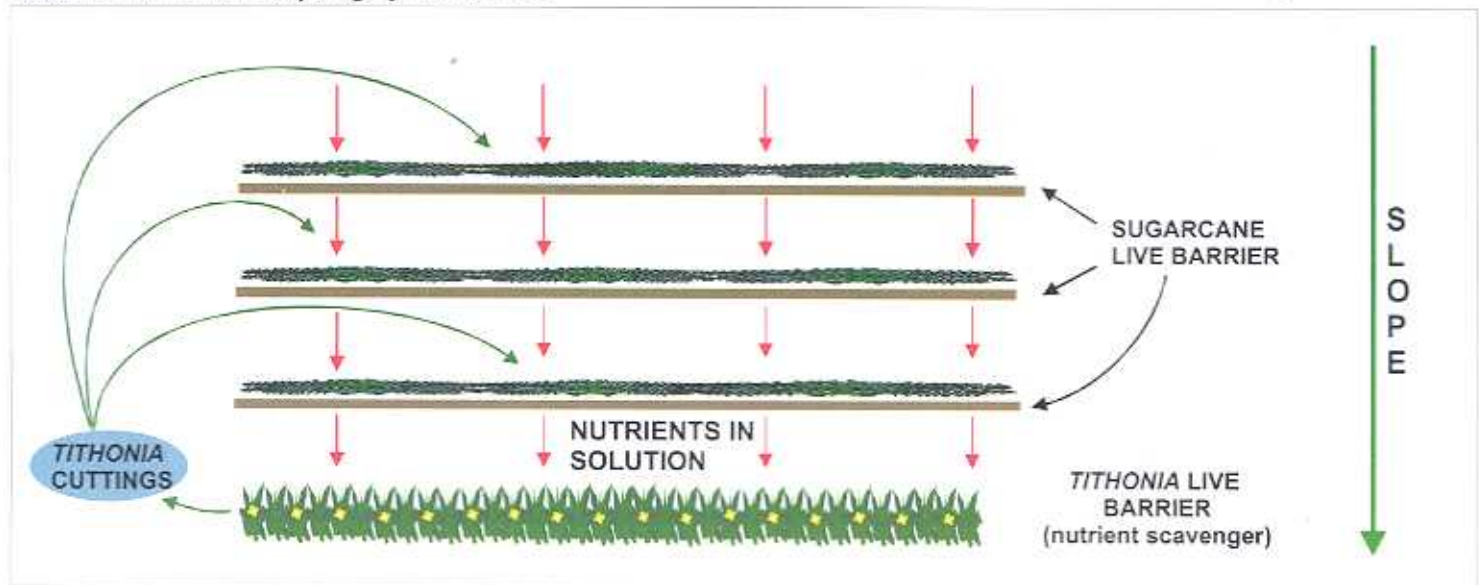
## Farm nutrient recycling through double purpose live barriers

The use of plants as live barriers has had success in erosion control in hillsides areas worldwide. However, the adoption of this technology by hillsides farmers has been limited by the perceived problems of high time and effort required to establish these barriers without other apparent benefits than erosion control.

The new design involves the combination of sugar cane barriers and one barrier of *Tithonia diversifolia* (Mexican sunflower). Sugarcane barriers are established perpendicular to slope and following contour lines, while the *Tithonia* barrier is placed at the lowest part of the slope of the farm.

This practice not only promotes an increase in farm profitability but also reduces the environmental impact of agricultural management in higher positions in the slope to those in lower positions.

Capture and nutrient recycling by live barriers



Double purpose live barriers aim at supplying an economic incentive to farmer besides reducing the soil losses through erosion.

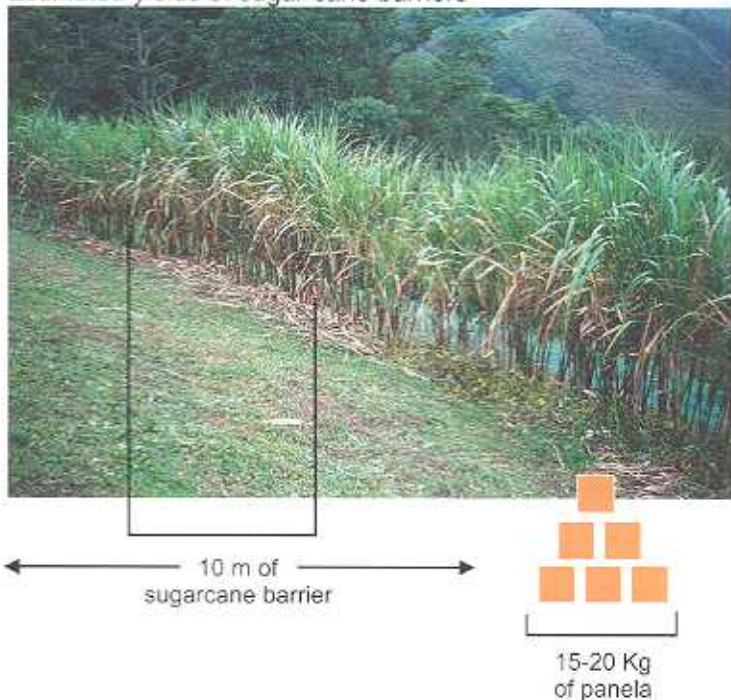
A recent practice developed by CIAT's SOL project (Spanish acronym for Supermarket of Options for Hillsides), has been the strategic combination of two types of double purpose live barriers in order to increase the productivity of barriers generating the economic incentive and at the same time reducing soil and nutrient loss through soil retention and nutrient recycling.



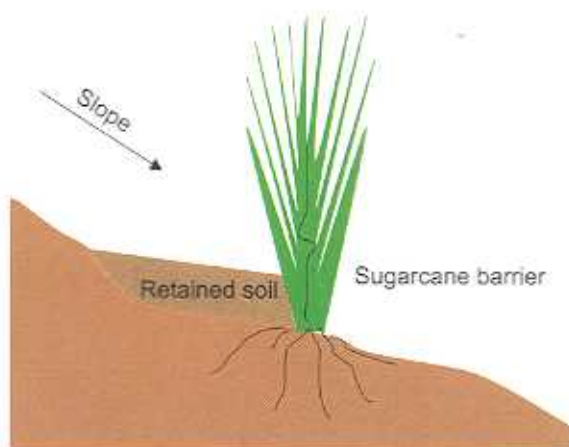
Sugarcane and *Tithonia* live barriers 'on farm' (Cauca, Colombia)

The sugarcane barriers have the capacity to produce sufficient brown sugar (panela) to satisfy an important part of household consumption and to generate additional income. Our trials indicate that it is possible to produce about 1.5-2.0 Kg of panela for every meter of sugarcane barrier, without fertilizer additions.

Estimated yields of sugar cane barriers



In addition, sugar cane live barriers control soil erosion and loss by reducing the speed of water flow down the slope and also by promoting the formation of natural terraces as a result of retention and accumulation of soil from higher positions in the slope.



Natural terrace formation

The *Tithonia* barrier is located in the lowest fringe of the farm to capture a considerable proportion of dissolved nutrients moving down the slope in the farm. Movement of dissolved nutrients out of farm boundaries is an economic loss and also an important source of stream water pollution. The choice of *Tithonia* is based on its ability to scavenge nutrients from the soil, even in degraded soils, and also accumulating them in its biomass in high concentrations. Typical nutrient concentration values for *Tithonia* biomass after flowering are:

Nutrient	Leaves	Stems	Flowers
	Concentration (%)		
Nitrogen (N)	2.9	0.6	2.0
Phosphorus (P)	0.3	0.1	0.3
Potassium (K)	3.0	1.8	2.5
Calcium (Ca)	2.6	0.3	0.8

Given the chemical characteristics of *Tithonia* biomass and its fast decomposition, it can be used as an organic fertilizer and can be applied to the sugarcane barriers in order to increase their productivity. In this way, the combination of sugarcane and *Tithonia* barriers on farm allows the increase of panela production by using one barrier as a fertilizer to the other. In addition to improving household food security, this system can be a source of additional income while reducing soil and nutrient loss as well as water quality problems of the people living down slope.

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