

Understanding Tropical Soils: Part 5

This article is continued from Understanding Tropical Soils: [Part 4](#).

by Dexter B. Dombro



Tree planting in organically enhanced soil at La Pedregoza.

Now that we have discussed some of the common problems with tropical soils, it makes sense to ask what might be the objective of using non-chemical fertilizers in tropical forestry. The simplest answer is sustainability. By this we mean more than just maintaining something at a certain rate or level. When we are talking about environmental and agricultural sustainability, we are talking about a jig-saw puzzle of interconnected pieces that produce a lasting and positive outcome. While paying the bills and being profitable are a necessary part of sustainability, the other side of that equation are better practices, better biodiversity, healthier plants and trees that imply healthier humans and the satisfaction of knowing that one is Earth-friendly. Sustainability is all of those things and more.

The [soil has a soul](#). It is more than just a medium in which we plant things. It is full of life, the very foundation of biodiversity. Bad practices in forestry and agriculture that ignore the needs of the soil result in long term problems and a loss of sustainability. The use of chemical fertilizers, herbicides and pesticides result in dead soil, removing all of the natural components that help trees and plants to be healthy, replacing them with chemical substitutes that simply don't do the job in the long term. Ironically, the so-called green revolution that produced bumper crops in dead soils is now facing a global backlash, as farmers go bankrupt, cancer rates spike, soils are no longer able to produce and biodiversity declines. Quick profits are not a replacement for sustainability, as people all over the world are discovering.



Agrochemicals are a quick fix, not a sustainable solution.



Making organic black soil at La Pedregoza with crushed biochar and compost for tree planting.

What are some of the negatives caused by using agrochemicals?

- The high cost of chemical fertilizers, herbicides and pesticides. This has led to an epidemic of [suicides](#) and bankruptcies by rural farmers in many developing countries.
- The high cost of transportation to haul chemical fertilizers, herbicides and pesticides to rural areas from urban factories.
- In order to maintain productivity, ever increasing amounts of chemical fertilizers are needed, until it is simply no longer profitable for the farmer or the forester.
- Dead soil and a loss of the soil's microfauna, including earth worms, soil fungi and more, with the resultant loss of biodiversity as other creatures in the food chain are affected, all the way up to humans.

- The [loss of honey bees](#) due to the use of herbicides and pesticides, leading to a pollination crisis in many places.
- Agrochemicals, especially when used in tropical soils with poor nutrient retention, can experience losses as bad as 90%, which is a very bad investment, with those chemicals ending up in the ground water and rivers.
- Agrochemical do not make the nutrients trees and plants need bio-available in the same way that earth worms, fungi and other microfauna make those nutrients bio-available.
- It doesn't take a genius to realize that agrochemicals cause environmental contamination.
- Crops, be they forestry or food related, are less resistant to plagues and diseases, requiring the application of other chemicals before they can be harvested or appear on your plate.
- Serious health effects on humans. For example, [Argentina](#) is now suffering from an explosion of agrochemical related illnesses.
- The constant use of agrochemicals causes the soil to be more compacted, asphyxiating the soil.
- The constant use of agrochemicals results in the soil losing its cationic exchange capacity (CEC – see [Part 1](#)), in other words it further aggravates problems with soil nutrient retention.
- Agrochemicals cannot be consumed by earth worms and other beneficial creatures living in the soil.
- The quality of products being produced is poorer, especially where foods are concerned (flavor, ingredients etc.)



It may take some time to change poor soils using natural silviculture and analog forestry techniques, but the results in terms of healthier trees and plants, living soil and sustainable forestry and agriculture speak for themselves.



Cebu cows can save the planet with their rich manure.

What are some of the benefits of implementing natural silviculture and organic agriculture solutions?

- The use of local resources to make fertilizers at a significantly reduced cost.
- No costly transport of fertilizers over large distances.
- Higher labor requirements resulting in greater local socio-economic benefits, but still cheaper than the purchase of agrochemicals and their transport.
- Soil that is alive and healthy.
- The avoidance of environmental problems and degradation.
- Less plagues and diseases affecting one's trees or crops.

- Production results that are equal to those achieved with agrochemicals, and superior when done with soil amendments like biochar (see [Part 2](#)).
- Organically managed soils have significantly better cationic exchange capacity (see [Part 1](#)) and soil nutrient retention.
- The forester or farmer is producing significantly less residual solids and contaminating garbage.
- Virtually all nutrients produced in natural silviculture and organic farming are bio-available to the trees and plants.
- Healthy organic soils have better water retention in the dry season.
- Organic fertilizers do not burn the roots of the trees or plants, a common problem with chemical fertilizers.
- A lot less soil acidity, especially in tropical soils, with the use of organic materials.
- Soils that are organically managed are less compacted and better aerated, which in turn assists soil microfauna.
- Forestry and agriculture that is more profitable.
- Plantations and farms which are more sustainable and Earth-friendly, with healthier humans living and working in them.



Black organic soil in tree planting bags at La Pedregoza, waiting for germinated seeds. Compare that to the sandy poor soil visible between the rows.



I hope this series of 5 articles will help to explain some of the problems faced by tree planters in tropical soils, and also lead to a greater awareness of the importance of managing the soil in an environmentally friendly manner. At the [Amazonia Reforestation](#) and [CO2 Tropical Trees](#) plantations in Vichada, the **La Pedregoza** team is developing a new way of doing things that we like to call “*natural silviculture*”. This goes beyond being merely organic, to include biodiversity considerations, such as using local earth worms instead of imported California red worms. It includes amending the soil to become less acidic, with better nutrient retention, for improved crops and forest cultivations. It means applying analog forestry (<http://www.analogforestry.org/>) considerations and recreating ancient technologies like **Terra Preta** and [Jivamritham](#). Perhaps most importantly it means becoming a model of sustainable forestry that others can copy, no matter where they are located, by using local resources and ingenuity.

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