

Healthy Productive Soils in Organic Cultivation Systems

On the 6th of December 2021, Naturland e.V. celebrated “World Soil Day” through an online seminar featuring three Naturland members, from Uganda, India and Paraguay, and their strategies to make soils healthy. Below is a summary of the key points of the presentations.

Introduction to World Soil Day by Eva Kohlschmid

Agriculture is intimately linked to the soil and yet, in a sense, has lost its "grip" on the soil. This online seminar is to celebrate World Soil Day, held annually on the 5th of December with the goal of raising awareness in human wellbeing by addressing growing challenges in soil. This year’s campaign is "Halt soil salinization, boost soil productivity".

Challenges in Soil

Since 1955, one third of the world's fertile arable soil degraded by intensive agriculture, that is worldwide 12 to 17 million hectares per year. The reasons are decline of organic matter, erosion/desertification, salination, climate change, land use changes, overgrazing, agrochemicals, and soil compaction.

Soil as a solution to many challenges

Soil is a key resource for food security, water, climate, and biodiversity. Some typical challenges in soil management are low organic matter content, soil erosion, nutrient deficiencies, low infiltration/runoff, low water holding capacity. Organic agriculture brings better soil structure, higher soil organic matter contents, higher biological activity. All this accounts for the high priority organic agriculture accord to conserving and restoring soil fertility.

“Manage Soils in a Holistic Approach - To Mitigate Drought”.

Krishnendu Chatterjee – “Justice to our Soil!”

Darjeeling Organic Tea Estates, India

Mr. Krishnendu shared his approach to mitigate draught via soil conservation.

Causes of draught are Soil Organic Matter (SOM) depletion, depletion of Mycorrhizal fungi, poor soil cover, deforestation, tillage. The following action can be taken:

Mycorrhizal Fungi

- Apply compost that supports bacteria or fungi

Tillage

- No tillage unless soil is rock solid
- Min/specified tillage

Enhancement of Soil Cover

- Soil cover is extremely important, needs a green layer to maintain moisture.
- Plant creeper legumes (peas, chick pea, cow pea) and trim to maintain height
- Mulch with wood flakes/dust in winter after application of composts

Enhancement in Soil Organic Matter

- Application of compost that best fits tea, quality is the key
- Application of vermicompost to soil

Road map of drought proofing plan

- In drought wind breaks/barriers are very important.
- Plantation cover crops (pea, chickpea, amaranth)
- Plantation of shade trees
- Silica supplementation to enable plant response to drought stress.
- **Watershed management:** with clear understanding of the water pathways in your region you can implement a watershed project.
- Enhanced water retention in soil

No government will be strong enough to tackle drought, and we must find solutions ourselves.

“Boosting Soil Productivity/Fertility – In Agroforest Systems”

Nicodemus Bamuhangaine - “Organic coffee in Uganda is dependent on the quality of soil!”

Ankole Coffee Producers Cooperative, ACPCU LTD, Uganda

Mr. Nicodemus work lies on the fact that there is a direct link between soil fertility and poverty. Organic coffee in Uganda is dependent on the quality of soil. The soil is the medium for plant growth. Healthy soils ensure a higher agricultural and industrial yield. And therefore, the farmer can have a higher income, and this aims at improving his quality of life.

Soil erosion is the most common in Uganda.

Main questions that farmers tackle:

- How can soil erosion be prevented?
- How can farmers generate enough organic matter in their farms?
- How can we integrate animal components in the farms?
- How can farmers increase their yields?

Strategie:

- Trenches to stop flowing water on the soils
- Planting cover crops in coffee
- Testing soil
- Planting agroforestry trees
- Integrating livestock in farming systems and promoting better management of the organic matter. Animals should be integrated in the systems while they provide manure. When adding that to other farming generated matter, will replenish soils.

Services provided by the cooperative

- Train extension staff and farmers
- Free soil testing services

“Keeping Soils Healthy and Productive” (Video presentation)

Ada Zarate - “The basis of organic production of any crop is the soil”

Cooperative Manduvira de Arroyos y Esteros Ltda. - Paraguay (Sugar Cane)

The cooperative Manduvira focuses on the production and conservation of the soil by **improving its fertility through different practices**. The cooperative offers technical assistance to its members to prepare the soil for planting sugar cane:

The different practices start with:

- Soil management and conservation through minimum tillage
- Management of living and dead plant mulch
- Incorporation of organic fertilizers such as compost
- Intercropping with legume species
- The use of harvest waste to produce compost

In the case of dead plant mulch, from debris of the crop, this serves to

- Control erosion,
- Improve water infiltration into the soil
- Reduce plant evapotranspiration and
- Reduce the emergence of weed seeds in sugar cane crops

The Manduvira cooperative have an organic fertilizer plant where they process all the industrial waste from the Manduvira sugar factory, which is filter cake, bagasse, ash to produce a type of fertilizer, which is organic compost. The main beneficiaries of this compost are the sugar cane producing members of the Manduvira cooperative.

Soil analysis is an important task, which is conducted in their own laboratory. This way, the fertilizer covers the nutritional deficiencies of the soil. There has been an increase in the demand for organic fertilizer since the creation of the organic fertilizer plant.

The Manduvira cooperative is making efforts so that the producers are in continuous soil management in order to maintain its fertility. In this way, the Manduvira cooperative guarantees respect for the basic principles of organic agriculture in terms of soil conservation and improves the economic income of its farmer-members.

Questions from the audience

Q: Rhizobium strain collection and release in the soil is also successful for newly planted shade trees?

A: Technically every tree species has a specific choice of microbiome consortium. It is possible in that way but commercially it will be challenging to be specific on selection.

Q: Any experience with using biochar to enhance especially water retention and soil fertility?

A: The use of biochar can be very effective. This needs to be polarized. As an amendment it works wonders.

Q: How is the manure application realized? Is it collected from grazing cattle?

A: Animal waste is collected from kraals, and zero grazing shades and is mixed with biomass produced at the farm and composted to create organic manure before it can be applied to the farms.

Q: As you say soil Erosion measures and promoting agroforestry is very important for your Farmers. How do you address these two key factors in your advisory Service Systems to your Farmers?

A: Yes, we identified many appropriate interventions and some with Manfred and Anne, we are implementing, doing many trainings for farmers, established nursery for shade trees, and farmers are accessing them from ACPCU.

Q: Would be good to address in future production of organic rice. Rice cultivation is different to the systems presented in this seminar.

Q: Sustainable way of potassium to soil. Difficulty in potassium, especially like coconut and pineapple o get good crop, high price and restriction to import in country.

A: It's a common belief in organic agriculture that potassium is limited. Potassium is second most abundant material in soil. Yes, there is a challenge because potassium is lying in soil in unavailable forms. Who does it: the fungi.

Additional Resources mentioned in the chat from participants

- [What is the contribution of organic agriculture to sustainable development?](#) A synthesis of twelve years (2007–2019) of the “long-term farming systems comparisons in the tropics (SysCom & FibL)” From Thomas (FibL):