STUDY TOUR
ARTISAN C-SINK CERTIFICATION

24. – 29. October 2024

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Content

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Participants:

Ministry of Agriculture Ethiopia	Mr. Takele Mulungeta Abera Mr. Desta Geremu Negera
Bureau of Agriculture Oromia	Mr. Gebrehana Eshetu Legesse Mr. Feyisa Bacha Mekonnen
University of Jimma	Dr. Milkiyas Ahmed Dr. Bayu Dume
IQQO	Mr. Tilahun Abera Mr. Gejea Kefyalew Assefa
C.B.E.N.	Mr. Erick Abala Ms. Solivar Fusi
Plant Village	Mr. Tracy Amondi Ms. John Mayieka Mr. Lawrence Ombwayo Ms. Mercy Achieng
Okere City	Mr. Ojok Okere
DBFZ	Dr. Annett Pollex Dr. Getachew Eshete Ms. Sophia Bothe

ETH-Soil Implementing Consortium in Oromia, Ethiopia

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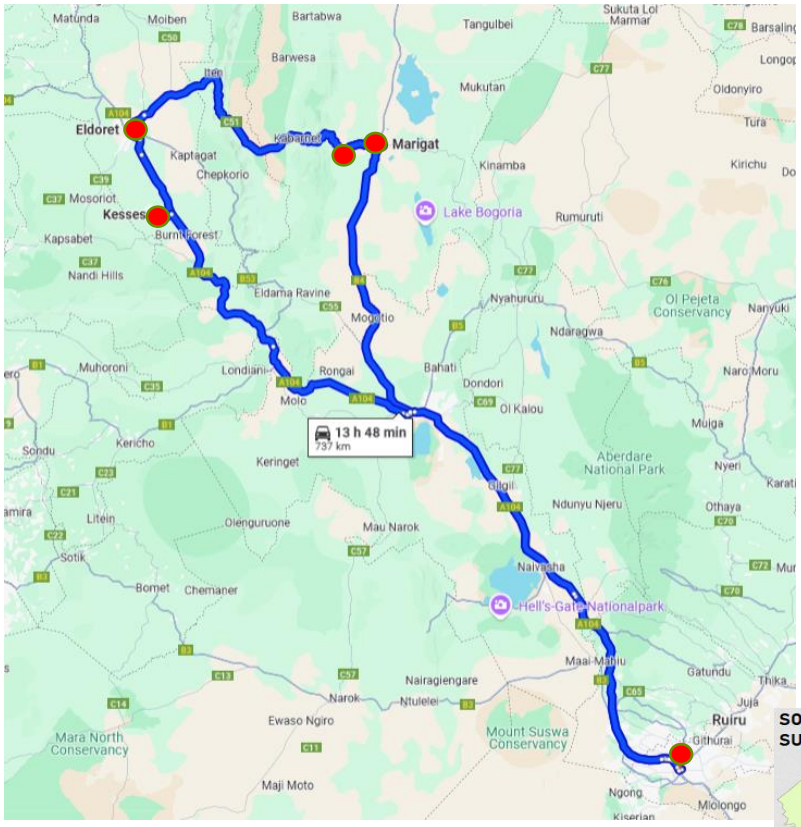
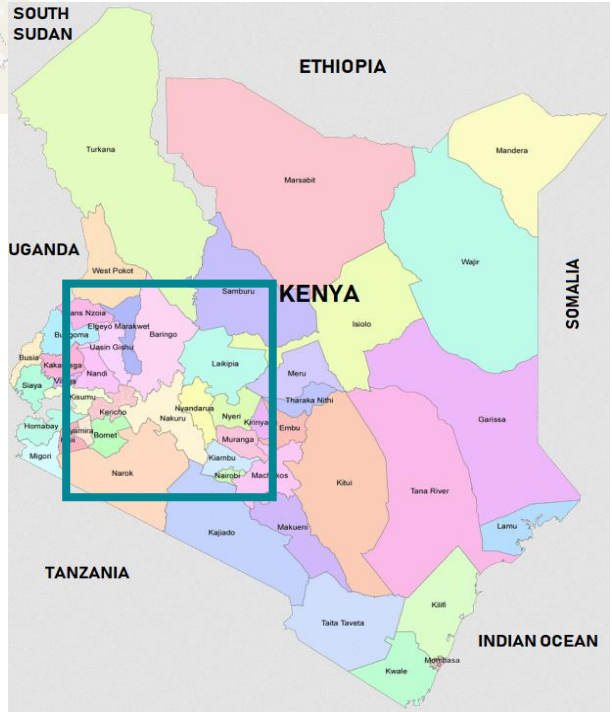
OVERVIEW TOUR

View on google Maps





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Competence Profile

C.B.E.N.

The Circular Bionutrient Economy Network (CBEN) is building the research, policy and operational basis for nutrient recovery from underutilised organic resources such as crop residues, market and waste and livestock and human excreta, to produce fertilisers and soil amendements that farmers in east africa can use to improve soil health, livelihoods and food security. CBEN unites an international community from east Africa and beyond in a robust community of purpose by convening strategic working groups, conferences and field visits. CBEN builds strong collegiality principled in democracy, transparency and collaboration among reseachers, NGO's, industry partners and government representatives.

DBFZ

The DBFZ (Deutsches Biomasseforschungszentrum) was founded in 2008 as a limited liability company (GmbH) and develops practical solutions along the value chains and cycles of biomass that are based on the "Smart Bioenergy Approach". Through applied R&D of technologies for the utilisation of biomass to produce energy and integrated materials, we are contributing to the achievement of a climate-neutral society, which, according to our vision, should become a reality by no later than 2050. The required transformation of the energy system can only succeed by massively reducing energy consumption, increasing energy efficiency, and steadily expanding renewable energies. A climate-neutral circular economy is based on optimised, closed "green" carbon cycles. By networking closely with numerous partners from science, industry and society, the DBFZ plays a key role in the development of rural areas - which are the points of departure for transition towards a bioeconomy. DBFZ's cooperation with international partners fosters the global transfer of knowledge and technologies.

ETH-Soil Projekt– Introduction

Ethiopia strives for an agricultural transformation to achieve food security, more rewarding jobs in rural communities and climate change adjustment.

The German Federal Ministry for Economic Cooperation and Development (BMZ) is committed to support the transformation of agricultural and food systems (social, economic and environmental). With ETH Soil, the DBFZ, is entrusted to contribute its expertise. For optimised biofertiliser production, suitable organic residues will be employed in fermentation, pyrolysis and different composting processes. Formulation and application tests will result in evidence-based receipts for different crops and soils. Ultimately, smallholder farms will benefit through increased food security and climate resilience of their operations.

The project partners aim at soil activation and productivity increases with carbon sequestration.

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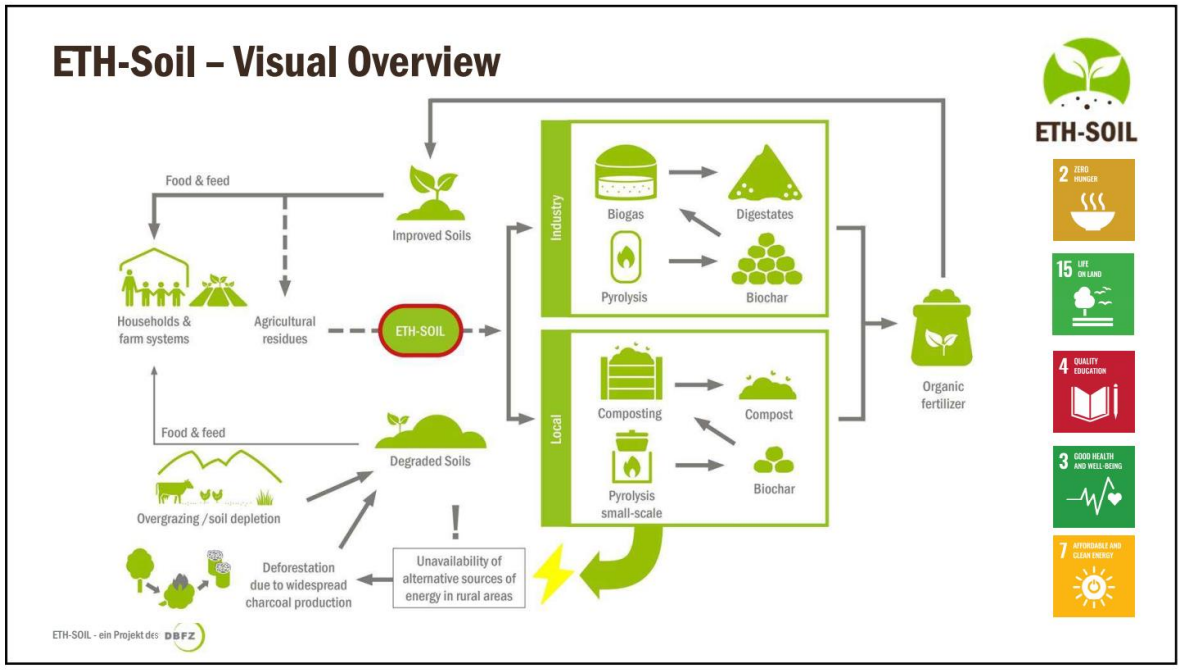

The study tour on Artisan C-Sink certification serves the following aims:

1. In the course of the study trip, participants of the Mininstry of Agriculture (MoA), Bureau of Agriculture Oromia (BoA), the Oromia Agricultural Research Institute (IQQO) and from the Jimma University should familiarize with the practice of Artisan biochar production and certification as implemented by PlantVillage in Kenya. They shall have the chance to discuss with practiconeers and farmers.
2. The participant shall gain insights of the field implemented Artisan C-Sink certification system. In particular, they shall gain a profound understanding of the digital monitoring and verification (DMV) of the biochar production and application process which is an essential process within the C-sink certification. Furthermore, the participants shall gain the competence to fulfill the complete responsibilities of the C-Sink manager as core person for the implementation of Artisan C-sink certification.
3. The participants shall be examining which administrative and regulatory steps would need to be addressed in Ethiopia to implement Artisan C-sink certification and agree which institution would take over the different responsibilities, i.e. C-Sink manager, linking person, trainer, evaluator.

https://www.dbfz.de/en/eth-soil/start

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Study on Tour - Introduction

We were very pleased to welcome you and present this 5-day study tour through Kenya. In this trip we learned about Certified Artisan C-Sink productions. We visited villages where biochar is produced from an invasive tree species and applied to pastoral land covering both raw material mobilization, biochar production and application, as well as another region where biochar production and application as biochar based fertilizer from crop waste and manure is established. We had many discussions and knowledge sharing with the researchers from Kenya, Ethiopia and Uganda, about biochar, its production and usage.

On our journey we learned about different steps of the certification process and tasks of involved persons. The goal of the trip was to gain experiences and knowledge to implement Artisan Certification in Oromia, Ethiopia.

On the next pages you find a detailed description for the locations we visited.

Ethiopian-Kenyan-German travel group, picture: Annett Pollex

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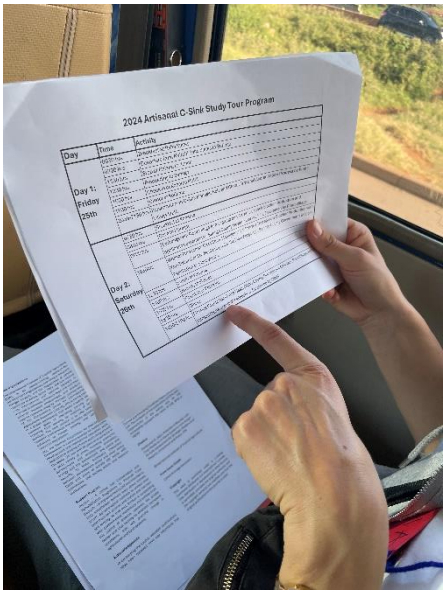
DAY 1 (24TH OCTOBER 2024)

Meeting at Raha Suites hotel for dinner. Ethiopian study tour participants arrived in late afternoon. After dinner Erick Abala from C.B.E.N. introduced the upcoming study tour. Everyone introduced themselves (name, profession, institution). Dries Roebrock (IITA) gave an introduction about his biochar research in Kenya. His report with the title "Potential of biochar with crop residues in maize systems of Kenya – ex-ante assessment for strategic guidance of research, investment and policy" is the literature for the road and will be discussed at the last day, back in Nairobi (Tuesday, 29th of November).

Time	Goal and Aim	Address / Person in Charge
05:00 PM	Arrival of Ethiopian participants at the Hotel, Check-In	Raha Suits Hotel Nairobi Erick Abala
07:00 PM	Socialising during dinner	All
08:00 PM	Introduction of the study tour by Erick Abala Presentation from Dries Roebock	Erick Abala Dr. Dries Roebrock

Streets in front of Raha Suites Hotel, Nairobi.

DAY 2 (25TH OCTOBER 2024)



Busride from Nairobi to The Koriema Resort, time to study the program plan.

The tour started in the morning from Raha Suites Hotel heading to Baringo county. During the ride, the Ethiopian participants were provided with the following questions for to answer:

- What do you know about the Artisan C-Sink Certification system? Try to limit yourself, 5 to 10 bulletpoints.
- What chances (three or more) do you see for your institution when you become C-Sink Manager?
- What challenges through (three or more) do you see for your institution when you become C-Sink Manager?

Time	Goal and Aim	Address / Person in Charge
07:30 AM	Departure to The Koriema Resort, Baringo County	The Koriema Resort
11:30 AM	Lunch and Walk in Nakuru	All
04:00 PM	Arrival at The Koriema Resort	
06:30 PM	Evening Program: Dinner with Plant Village Presentation of Plant Village and an introduction of Artisan C-Sink Certification* Expectations of the study tour were discussed	

*Find video recordings / slides of the presentations and the tour at:

During the tour, we already had the chance to observe common fertilizer commercialization praxis and discussed about legislation and current problems.

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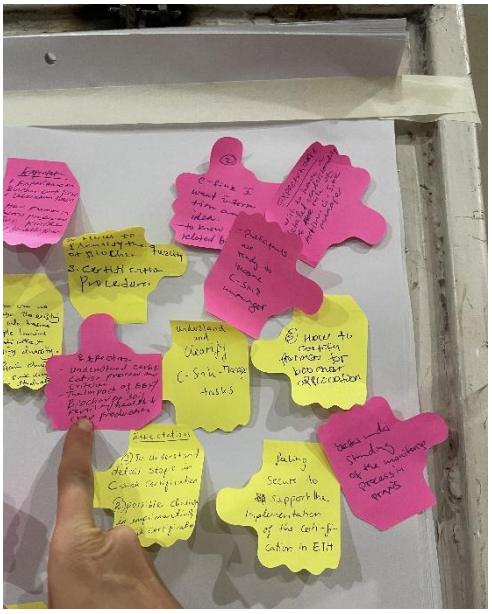
Fertilizer selling along the road.

Informal discussion on Artisan C-Sink aspects between IQQO, DBFZ and MoA.

At Koriema Resort, participants used the time to get acquainted and share their expectations.

The evening event provided insight on the C-Sink manager role and Global Artisanal Accreditation Process. Furthermore, it collected expectations of the participants. Frequently mentioned expectations were the better understanding of: tasks of the C-Sink Manager, certification process, biochar monitoring process, steps and challenges of the certification, quality of biochar, impact of biochar based fertilizer, commercialization of biochar, the financing via the sale of carbon credits and networking.

Participants of the study tour listenting to the presentations.



Left: Tracy Amondi from Plant Village introduces the Artisan Certification. Right: Collection of expectations (full list in the travel report).

DAY 3 (26TH OCTOBER 2024)

Besuch Baringo county

Prosopis juliflora was introduced to Kenya as a solution to enable plant growth in regions with minimal rainfall, as it thrives with very little water supply. While the plant established itself well, it soon became overly invasive, occupying large portions of pastoral land and creating challenges for local communities. To address this issue, governmental support has been provided to manage the spread of *Prosopis juliflora*, and organizations like PlantVillage are actively contributing to these efforts.

An essential aspect of such initiatives is identifying "model farmers" who can act as multipliers within their communities, demonstrating effective practices and encouraging others to follow suit. During our visit, we had the privilege of exploring the farm of Moses and his wife. They have successfully cleared a section of their land from Prosopis juliflora. The woody material from the cleared plants was utilized for biochar production, while the smaller branches were repurposed as fencing to protect the restored arable land from goat grazing, enabling the revival of productive farming in the area.

Prosopis juliflora growing in Marigat, Baringo county.

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Top: John from Plant Village introduces the Artisan Farmer Mohammed from Marigat.
Below: Farmer Mohammed is telling his experiences with biochar.

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Top left: Participants examine the *Prosopis juliflora* biochar ing bags, beside the field. Top right: The field that was cleaned from *Prosopis juliflora,* treated with biochar and planted with elephant gras.

Bottom left: John and Lawrence from Plant Village discuss with participants from Jimma University and C.B.E.N. Bottom right: *Prosopis juliflora* branches as a fence for growing trees to protect them from grazing by goats.

Next, we visited a production site where the entire process was demonstrated to us. The land is first cleared, and the woody material is left to dry for approximately two weeks. Several Kon-Tikis were operated in parallel, with six trained operators managing the process. The amount of raw material is not measured precisely but is instead estimated based on the density of *Prosopis juliflora* before clearing. An evaluator oversees the operation, and the monitoring methods were explained to us in detail.

Particular attention was given to the labeling system for the produced bags. Instead of attaching individual QR codes to each bag - which could fall off during transport - laminated QR codes are used. These are stored centrally and collected at the start of each production day. The number of labels and bags required is determined based on experience. With the geotagging of the production site, the labels can be accurately linked to the specific production batch. This entire process is also documented in an app, ensuring seamless traceability.

Left: *Prosopis juliflora* biochar production side with three Kon-Tikis.

Bottom: Burning Kon-Tiki in the background; Prosopis juliflora biomass, biochar in bags, tools (buckets and plane) and a water quenched Kon-Tiki in the foregorund, beside the ethiopian study tour participants.

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Top left: Burning Kon-Tiki, surrounded by *Prosopis juliflora* biomass. Top right: *Prosopis juliflora* biomass.

Bottom left and right: Produced biochar in bags.

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Top left: Burning Kon-Tiki with bags and tools in the background. Top right and bottom: Presentation of the production side and discussion from and with Plant Village. Beside the study tour participants local government was present.

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Top left: Laminated QR-code of biochar bags. Bottom left: Observing person scans the QR-code of a specific biochar bag. Top right: Observing person follows the step-by-step instruction of the Plant Village app. Bottom right: Bunch of produced and monitored biochar bags.

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DAY 4 (28ST OCTOBER 2024)

On Monday, our study tour took us to the village of Suriet in Uasin Gishu County, where biochar production was established in October 2023. This region is known for its extensive maize farming, which generates a significant amount of residual biomass, primarily maize stalks. These residues, if not used as animal fodder, are typically burned in open fires, contributing to environmental concerns. To address this, PlantVillage employs 15 agents who actively mobilize farmers to participate in the biochar initiative.

The mobilization process begins with the local administration, which is consulted first to ensure community buy-in. Village extension officers are also trained early on to support the program effectively. The initiative is further backed by the Ministry of Agriculture, which grants permissions and provides training. After demonstrations and training sessions, farmers were motivated to contribute their maize residues to the project. Pre-dried residues are processed using an electric multiblade buzz saw, which chops them into smaller pieces for efficient biochar production.

The impact of this initiative is evident. Eighty percent of the biochar produced is returned to farmers to enrich their fields, while the remaining 20 percent is sold in local markets, with the community actively involved in the distribution. Farmer Merry shared her experience, recounting her initial skepticism. However, after witnessing a noticeable increase in crop yields, she became a strong advocate for the program. As word spread, more farmers joined, and now the project involves 200 farmers who apply 50 kg of biochar per hectare.

The visit provided further insights into the approach and procedures implemented by PlantVillage. The abundance of maize residues in the region, combined with the willingness of trained farmers to contribute, demonstrates the potential of biochar production as a sustainable agricultural practice.

Worker, employed with Plant Village presents their production side in the village of Suriet, Uasin Gishu county.

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Field with maize residues “tents” along the street.

Gathered maize residues at the biochar production side.

Semi automatic maize straw cutting machine.

Workers explain how the machine is working.

John and Brian from PlantVillage are starting the machine.

Workers feeding the machine with maize straw.

The chopped maize straw is filled into the storage bin of an automated kontiki tower. Heat of pyrolysis is used for drying of the chopped maize straw above kontiki vessel. Automated feeding according to intervals determined in pretests. Up to three kontiki loading are possible per day. The pyrolyzed material is collected in a bin below the Kontiki where it is allowed to cool before being further processed. The cooled material is packed into QR code labelled bags and stored until mixing with manure in a shed.

Chopped maize straw (10 cm)

Kon-Tiki tower

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The biochar is manually mixed with manure in a 1:1 ratio by volume and left to dry before being packed into dedicated biofertilizer bags. A portion of the biofertilizer is returned to the farmers who provided the maize residues, while the remaining material is sold. The mixing of biochar with manure is regarded as the final step in the monitoring process, meaning that further documentation is not required once the material is introduced into the soil as part of compost or manure. Additionally, the biofertilizer is applied to demonstration plots, serving as a practical tool for farmer training and raising awareness about its benefits.

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Biochar based fertilizer bag with information on the nutrient composition.

Kitchen garden on the biochar production side, treated with bichar based fertilizer.

Evening activity with Hon Edward Sawe and Kiplimot Lagat, CECM for Agriculture, Livestock and Fisheries, Hon Edward Sawe.

Discussion with Hon Edward Sawe, CECM for Agriculture, Livestock and Fisheries.

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DAY 5 (29TH OCTOBER 2024)

Return to nairobi and wrap-up and final presentation. Dries Roebrock presents his ex-ante assessment for strategic guidance of research, investment and policy “Potential of Biochar with Crop Residues in Maize Systems of Kenya”.

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DAY 6 (30TH OCTOBER 2024)

Departure