Submissions for the USD 15,000 prize at the Global CSA Conference

Winner

Business solutions for soil restoration

Duncan Gromko, KOFAR Kenya Limited, Kenya

KOFAR Kenya Limited is a for-profit company founded in Kenya in 2015. KOFAR sells organic products to East African farmers that help to restore damaged soils and boost agricultural productivity via sustainable means. Through its operations, KOFAR contributes to global objectives of climate change mitigation, land restoration, food security, and poverty reduction. KOFAR is majority-owned and managed by Francescah Munyi, a Kenyan who saw her mother's coffee production declining and wanted to develop a sustainable solution. Through partnerships with soil scientists, she developed products to help famers like her mother. KOFAR's sales are increasing year on year, and the company is on track to become profitable. KOFAR's main products are an organic fertilizer produced with local inputs, an enzyme formula, and a soil conditioner. Additionally, KOFAR provides farmers with advisory services on appropriate farming practices.

Other submissions

Perennial grain crops in the rotation for enhancing soil carbon sequestration and sustaining crop production

Sikiru Yusuf Alasinrin, University of Ilorin, Nigeria and PhD student at the Federal University of Agriculture Abeokuta, Nigeria

Perennial grain crops, such as intermediate wheatgrass or kernza (Thinopyrum intermedium [Host] Barkworth and Dewey) (Fig. 1), can supply wheat grains for three to four years without the need of planting every year, have as much as eight times greater above- and belowground biomass than annual spring wheat (Sainju et al., 2017), reduce N leaching, and can be relatively grown in marginal land. Because of the greater root biomass and grown in undisturbed soil condition, inclusion of intermediate wheatgrass in rotation with cereals and legumes can significantly enhance C sequestration in above- and belowground biomass and in the soil due to increased C input. While grains can be used as food for human consumption, aboveground biomass can be used for animal feed and bioenergy production. Long-term crop rotations containing intermediate wheatgrass, cereals, and legumes to efficiently utilize soil water and nutrients and reduce N fertilization rate and N leaching can increase C sequestration, sustain crop yields, and reduce chemical inputs, thereby enhancing soil health and environmental quality.

Increasing crop productivity and soil carbon storage on sandy soils: No soil left behind!

Ngonidzashe Chirinda, CIAT, Colombia

In arid and semi-arid regions, smallholder (SH) communities continue to suffer due to soil-based poverty. Crop production on coarse-textured soils, characteristic of several SH farms, is limited by low water and nutrient retention capacities. Nonetheless, the Subsurface Water Retention Technology (SWRT), which has been shown to double crop production with half the irrigation water, has the capacity to radically transform marginal soils into productive soils. This ground-breaking technology has been field tested (details are found on www.swrtsolutions.com). Moreover, SWRT can also increase carbon sequestration and reduce greenhouse gas emissions bringing marginal soils in the race to sustainably feed the world.

Carbon sequestering and sustainability of rice-wheat cropping system of South Asia by resource conservation technologies of climate-smart agriculture

Adnan Zahid, Institute of Agricultural Sciences, University of the Punjab, Lahore, Pakistan

The rice (Oryza sativa L.)–wheat (Triticum aestivum L.) cropping system is the worldwide largest agricultural production system and around 24Mha is under this cultivation in Asia. Many elements have threatened the long-term sustainability of conventional rice–wheat cropping systems, including degradation of soil health, water scarcity, labour/energy crises, nutrient imbalances, low soil organic matter contents, complex weed and insect flora, the emergence of herbicide-resistant weeds, and greenhouse-gas emissions (22–46% of the global budget of CH_4, & 1.4 to 18.9 Tg N_2O–N yr^{-1} IPCC, 1996). Farmers need alternatives to conventional intensive tillage and crop establishment practices to help them conserve water, labor, and energy; cope with the increasing cost of cultivation; and improve the quality of life for farm families. Adoption of resource conservation technologies of climate-smart agriculture i.e. no-till for rice and wheat, inclusion of legume after wheat harvesting, carbon sequestration, soil health, laser land levelling, smart nutrient and water management, etc., can help improve the yield and sustainability of the rice–wheat cropping system. Farmers of these countries are illiterate due to which they are very much away from recent advancements. We need to make people and establishments aware of climate change and create carbon sequestration demonstration plots at every village. The outcome will help the farmers and policymakers design suitable rotation and tillage system for their land.

Improving monitoring of soil and biomass carbon sequestration using microwave remote sensing to enhance climate-smart agriculture

Stella Ndirangu, Agriculture and Climate Risk Enterprise Ltd (ACRE Africa), Kenya

Microwave remote sensing has become key in monitoring of land use land changes due to its ability to penetrate clouds and allow accurate monitoring by overcoming the lack of data due to bad weather. The NASA Soil Moisture Active Passive satellite provides a level 4 product that is key in monitoring seasonal carbon changes globally due to soil and vegetation sequestration. The main challenge of the level 4 carbon product from SMAP is that the product is provided at a low spatial resolution of 30km. By combining the SMAP level 4 product with other ground monitoring data on carbon soil sequestration, this research will enhance the monitoring of soil and biomass sequestration of carbon, providing real-time, affordable and accurate data on the condition of specific areas. A timeseries product will be created to enable comparison of historical activities in relation to agricultural production which can then be used to identify threatened carbon sinks and reservoirs. Agricultural practices that encourage areas to act as sinks and reservoirs will then be suggested. This include, minimum tillage, conservation agriculture and re-afforestation.

The side event at the 5th Global Science Conference on Climate-Smart Agriculture was organized by: