SANREM CRSP: Cross-cutting research adapts conservation agriculture for dryland smallholders in developing countries


The Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program (SANREM CRSP) is sponsored by the U.S. Agency for International Development’s Bureau of Food Security, participating country institutions, and host country institutions around the world.

Our research engages stakeholders at all levels to develop sustainable, localized farming practices. The multi-country program is comparative, with research identifying common elements that affect conservation agriculture adoption.

The research theme of SANREM CRSP’s current phase is to develop conservation agriculture production systems (CAPS) at increased soil quality and fertility. Farming systems with CAPS will minimize soil erosion, increase soil organic matter, and utilize crop rotation systems.

GendersPerspectives for Conservation Agriculture

This project uses participatory research to address gender-related factors contributing to the success or failure of CAPS. Understanding women’s and men’s local knowledge, beliefs, and perceptions of soils is essential for the adoption of CAPS. Women have specialized agricultural knowledge in areas such as soil quality and crop-livestock management. Their knowledge often differs from that of men’s based on women’s practices, access to and control of assets, and other factors that may provide incentives (or disincentives) for their participation in CAPS. Research will draw comparisons between local knowledge/participatory techniques and scientific/technical methodologies.

This CCRA explores three questions:
1. What are men and women’s local soil knowledge, beliefs, and perceptions; soil management practices; and access to agricultural resources, including land, information, and soil inputs?
2. What are the gendered landscapes linked to knowledge, beliefs, and perceptions of soil quality and soil management practices?
3. What is the gendered nature of access to and control over animals and animal by-products in contexts of crop-livestock interaction?

The Gender CCRA employs a series of qualitative research techniques: community-level focus group discussions and activities to map community soils; household visits to carry out the same activities at the farm level; transect walks; participant observation of farming practices. Farmers identify and describe different soil types, including their “best” and “worst” soils. Samples are then collected from these soils and analyzed in collaboration with the Sociology CCRA. Farmers’ soil descriptions will be compared with lab results and examined for gender differences.

It is expected that women will use descriptors related to soil fertility while men will describe soil in terms of physical properties. In addition, after farmers identify soil types on their land through hand-drawn maps, plots will be mapped using GIS. In both mapping and soils knowledge, a participatory farmer-led approach will be linked to a technical, scientific perspective. Sources of knowledge, beliefs and perceptions of soil quality will be explored through household interviews and analyzed in conjunction with the Technology Networks CCRA.

Soil Quality and Carbon Sequestration

The over-arching goal of this CCRA is to determine if dryland smallholders in the developing world who adopt CAPS can increase soil organic carbon (SOC) and soil fertility. We know that CA increases SOC under managed agriculture in the developed world, but it is unclear if such increases are feasible in developing countries. We will also look at the potential for carbon sequestration in these systems, which could lead to payments under carbon trading schemes.

This project coordinates soil and agronomic investigations in all of SANREM CRSP’s 13 host countries to measure soil fertility and carbon sequestration before and after conservation agricultural production systems (CAPS) are implemented. We are coordinating the LTRAs’ data collection in order to make meaningful and scientifically verifiable comparisons across all project sites.

Our specific objectives are to:
1. Quantify SOC in host country project sites before and after CAPS implementation.
2. Identify CAPS cropping systems or biophysical elements that improve soil fertility.
3. Determine increased soil fertility to site-specific socioeconomic environments.

We are building a soils library from all project countries at 0-5 and 5-10 cm depths from researcher-managed sites. These samples will be analyzed for pH, CEC, total organic C (TOC), total N, extractable P, K, Mg, Zn, Cu, B, Mn, and Fe. Since we may not find differences in TOC over the short term (<5 years), we will fractionate TOC into labile and recalcitrant fractions using size-based and density-based fractionation procedures.

We also facilitate LTRAs and host-country partners to build capacity regarding biophysical data collection from CA plots vs. current practice controls.