

Smart Soil and Water Management for Combating Climate Change

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Agriculture considered both a significant cause and a victim of world climate change. Agriculture is directly responsible for 10 - 12% of global anthropogenic-generated greenhouse gas (GHG) emissions. In addition, afforestation (forest clearance for farming), and soil and water mismanagement when included, agriculture becomes responsible for a much higher share of GHG emissions. Increasing food production without further increasing GHG emissions from agriculture is a hard challenge all over the world (Pye-Smith 2013). Agriculture in developing countries must undergo a significant transformation in order to meet the related challenges of food security and climate change.

In this context, climate smart agriculture (CSA) has three main pillars “sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation) and enhances achievement of national food security and development goals” (FAO, 2010). However, CSA is sustainable agriculture that includes resilience concerns while at the same time aiming to reduce GHG emissions.

CSA = Sustainable Agriculture + Resilience - Emissions.

CSA is not a new agricultural system nor a set of practices. It is a new approach brings together practices, policies and institutions that are not necessarily new but used in context of climatic changes. CSA has four levels: farm level, landscape level, markets level and regional-national-global policies.

Seven tools for achieving climate smart agriculture are recommended (carbon smart, water smart, nitrogen smart, energy smart, off-farm smart, weather smart and knowledge smart). On farm and landscape levels the key tool for CSA is the increase of carbon sequestration in the agricultural soils using different methods of conservation agriculture by reversing the carbon pump. Carbon storing could be achieved by: vegetative cover, mulches, biomass, no- and minimum-tillage, ridge-till planting, cover crops, grass strips, crop rotations, agroforestry, etc.

The overall strategies of CSA are to:

1. Improve Productivity and Incomes through: Irrigation and agricultural water management; Improve Food Storage and Distribution, Increased Growth of Incomes.
2. Build resilience and associated mitigation co-benefits through: Improve soil health, and restore degraded lands; Conservation of Natural Resources and Catchments, Enhancing extension, climate information services and agro-weather advisories; Early Warning System and Emergency Preparedness; Synergies in adaptation and mitigation.
3. Research for Development and Innovations through: Agricultural research funding; Uptake of Agricultural Technologies and Innovations along the Value Chain and Ensuring that Research Extension Linkage is strengthened and more functional
4. Examples of climate smart production systems.

Recommendations

- Reduce conventional soil management and adopt sustainable soil and water management by reducing deep tillage and increase organic and bio-fertilization on account of chemical fertilizers which encourage soil carbon sequestration.
- Expanding the cultivation of dry rice varieties and switching of long-duration traditional cultivars to early-maturing short-duration rice cultivars without reducing the area of this strategic rice crop.
- Stop the open-field burning of agricultural waste to reduce emissions that increase global warming and adopt recycling strategies.
- Protection and development of wetlands which could be instrumental in formulating efficient strategies related to carbon sequestration and reduction of GHG in coast of Mediterranean north Egypt.
- Encourage and stimulate projects to convert crop residues into organic fertilizer, compost or biochar and return it to the soil as a sustainable conservation strategy.
- Building farmers' awareness of modern methods and measures to manage soil and water in the presence of extreme climatic changes
- Adopting Climate smart farming systems and provide farmers with appropriate guidance and on time forecasts to deal with severe weather waves. Expanding the use of smart systems in land and water management and digital farming systems that help protect the soil and provide water, fertilizers and pesticides to mitigate climate change.
- Reduce the use of heavy agricultural machinery and replace it with small light machines suitable for the small and fragmented agricultural holdings, which reduces soil degradation on the one hand and reduce carbon emissions from high fossil fuels consumption.
- Adopting future projects to protect the Nile Delta from sea level rise guided by the Dutch expertise in this regard and to protect about 1.5 million acres of submersion and salinity and the consequent serious decline in the food basket in Egypt.
- Expansion of water harvesting projects from rainfall and floods by setting up the necessary engineering constructions in the most vulnerable areas in Sinai and eastern Nile Valley to minimize the economic and human losses.

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