

Climate Smart Agriculture (CSA): Farmyard Compost

Climate Smart Agriculture addresses the challenges which climate change (CC) poses to agricultural production. It is a pathway towards sustainable development and food security and is built on three pillars:

- Increasing agricultural productivity (crops, livestock and fisheries) and income
- Enhancing resilience or adaptation of livelihoods and ecosystems towards climate extremes
- Reducing and removing GHG emissions from the atmosphere (FAO 2016)

An agricultural technique or practice that contributes to the achievement of these pillars can be considered climate smart. But often, different techniques perform differently over the three pillars, and therefore have to be combined in an integrated CSA approach to complement each other and maximize their benefits (Worldbank 2015, FAO 2015).



Climate-smartness Categories

In the 15 climate-smart villages established by CGIAR in Western Kenya for example, a farm is only counted as climate smart if it applies practices that are strong in all climate-smartness categories:

- Soil and water conservation structures
- Integrate perennial and annual crops
- Improved livestock enterprises
- Diversification of enterprises
- Readiness of a farm plan

Sometimes it is difficult to assess how climate smart a specific agricultural technology is in a certain context. Climate-smartness indicators, divided in three categories, try to indicate this and thereby support implementation.

- CSA-Technology indicators evaluate beforehand how well technologies will achieve CSA goals.
- CSA-Policy indicators assess to which extent the enabling environment (e.g. policies) support the implementation of CSA.
- CSA-Result indicators monitor the short term impacts of CSA interventions (Rawlins 2015).

The World Bank in collaboration with international partners has developed three indicator sets to support CSA implementation at the national and sub-national levels. The indicators will guide CSA investment decisions, and assist national governments, agricultural specialists and natural resource managers in evaluating the productivity and climate benefits of sustainable land management operations.

How do you implement CSA?

CSA requires site-specific assessments to identify suitable agricultural production technologies and practices (FAO 2015).

For Kenya adapted practices include:

- Soil and Water conservation measures increase ground cover and use little water.
- Manure and compost can decrease use of chemical fertilizers and adequate manure management for biogas production can reduce methane release.
- In agroforestry systems trees and crops coexist and benefit from each other.

Activities that amplify Climate Change effects include:

- Inadequate tillage practices that expose the soil release carbon stored in the soil.
- Indiscriminate use and wrong timing of agrochemicals harm the ecosystem.
- Clearing land and burning plant biomass for farming releases carbon stored in the soil.

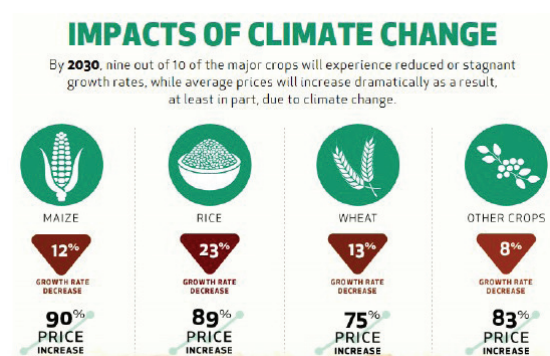
Why CSA?

Therefore CSA is a basket of agricultural practices and techniques that not only aims at increasing profits and resilience for farmers but does so without harming, often even bettering, environmental parameters. It improves input efficiency, soil quality and benefit-cost returns for farmers while limiting the expected negative effects of climate change on Kenyan agriculture for producers and consumers (Worldbank 2015, FAO 2016).

What is climate change?

Climate change (CC) is the long-term or permanent shift of average climatic conditions (FAO 2015). They result in changes of weather patterns and directly affect agricultural production. Kenya is highly vulnerable to the impacts of climate change. Some of the most visible changes are:

- Increase in mean temperature;
- Shifts in the onset and end of the rainy seasons;
- Changes in duration, amounts and intensity of rainfall;
- Higher frequency of droughts and floods;
- Changing strength and direction of winds;
- Higher temperatures and stronger solar radiation;
- Occurrence of more and new pests and diseases (FAO 2015, Worldbank 2015).



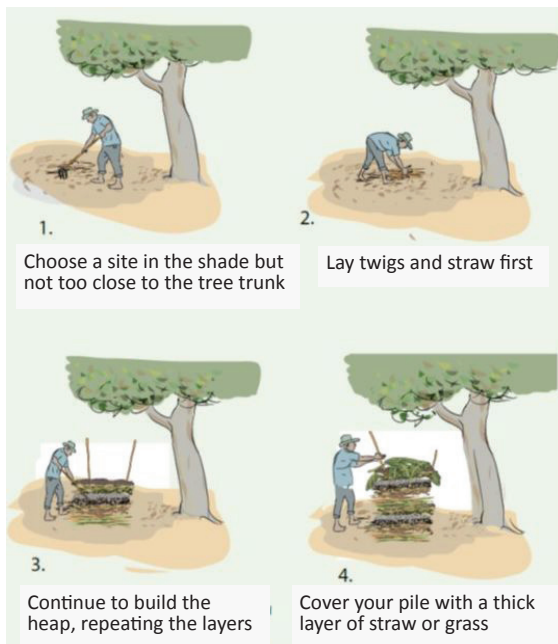
Kenya's agriculture is especially vulnerable to climate changes¹ because of its large dependence (98%) on rainfed agriculture (Worldbank 2015). Depletion of water and pasture resources are expected consequences under which mainly smallholder farmers will suffer. They might lose income and livelihoods through crop failure and livestock losses. A 30% drop is expected for the productivity of crops, livestock, forestry, fisheries and aquaculture, endangering Kenya's food security and rural livelihoods (FAO 2015).

Mankind is, however, not only negatively affected by CC, they also contribute to it by emitting greenhouse gas (GHG) emissions to the atmosphere. Agricultural production is next to industry and transportation a key contributor to CC. Several activities, such as clearing land, burning of biomass or wood, some tillage practices or indiscriminate use of agro-chemicals all amplify the effects of CC by releasing GHG (FAO 2015, Worldbank 2015). On the other hand, agriculture has the potential to contribute to reducing GHG emissions. A variety of adapted agricultural practices, summed up under the term "climate smart agriculture", minimize harmful effects or even reduce emission or absorb GHG.

¹ However, more positively, such climate change projections suggest that, in some places, opportunities for crop diversification and intensification may emerge, including options for expanding into places where cultivation is not currently possible.

Farmyard compost

Compost is a combination of wet and dry plant material and manure that by decomposing together form a rich plant food. Compost making is a natural process of turning organic material into humus.



For making compost the farmer needs (FAO 2015):

- Rough matter- twigs or branches
- Dry organic matter- Maize stalks or leftovers from other crops, wood shavings, dryweeds, etc.
- Green weeds, grass, shrub cuttings e.g. stinging nettle, leguminous trees - anything green
- Fresh animal manure
- Wood ash
- Water

Animal manure contains most of the nutrients that crops require in different contents depending on the livestock species. It is therefore very valuable to enrich the compost, but stored and applied poorly, components can convert into Greenhouse Gas (GHG) and foster climate change. Therefore it is very important to collect manure directly, apply soon, store properly (covered, cooled) or compost it which also reduces the GHG emissions of manure.

Manure can additionally be used to create renewable energy with a so called biogas digester (FAO 2016, FAO 2015).



Why Composting?

Composting is an efficient way to avoid wasting useful natural resources. About a third of all household waste can be reused as compost to enrich soils and boost plant growth. Compost is a free of costs, easy and high quality alternative to agro-chemicals that not only fertilizes the soil but also introduces beneficial organisms that help to aerate the soil and break down organic material for plant use. It is a simple way to add nutrient-rich humus which stimulates plant growth and restores vitality to depleted soil. Composting also helps the soil to hold water and keep plants free from diseases.

Manure is a very good addition to compost and its use in compost reduces negative emissions that badly managed manure can evoke. Using manure for compost making keeps its good fertilizing qualities without increasing weed growth as manure applied directly normally does (FAO 2015, FAO 2016).

How does composting contribute to CSA?

The contribution of composting to the three pillars of climate change differs significantly:

1. Increasing agricultural productivity and income: Compost, possibly enriched with manure, can significantly improve crop production and soil quality and thus has a positive effect on farming families' income.
2. Enhancing resilience or adaptation of livelihoods and ecosystems towards climate extremes.
3. Reducing and removing GHG emissions from the atmosphere: Composting and including manure into compost has strong effects on this pillar because wrongly managed manure can have decisive negative impacts by emitting GHGs. Using manure for compost or also biogas production thus reduces the release of methane. On the other hand, if incorporated in the soil, manure and compost will contribute to the carbon sequestration process (Worldbank 2015, FAO 2015).

Main sources:

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Diagrams:

Page 1: CSA Pillars, CalCAN 2010; <http://calclimateag.org/what-is-climate-smart-agriculture/>

Page 2: Projected impacts of climate change on main crops in Kenya by 2030, Tegemeo Institute 2010

Page 3: Climate Smart Agriculture. Training Manual for Extension Agents in Kenya. FAO, Ministry of Agriculture, Livestock and Fisheries - State Department of Agriculture. FAO Kenya, 2015, pp. 32, 54

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In Cooperation with:

