Climate Smart Agriculture

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Agriculture has to address simultaneously three intertwined challenges:

1. More food, in quantity, quality and diversity
2. Adapt to climate change,
3. Contribute to mitigate climate change

Addressing these challenges will require radical changes of food systems

It is precisely to designate these changes that FAO has forged the concept of "Climate Smart Agriculture" (CSA), as a way forward for food security in a changing climate. CSA aims to improve food security, adapt to climate change and contribute to mitigate climate change by adopting appropriate practices, develop enabling policies and institutions and mobilizing needed finances. In order to ensure food and nutrition security and to meet an increasing demand, production has to increase, particularly in developing countries. Climate change, both increased variability and slow onset changes, will impact food systems, especially where they are already most vulnerable. Agriculture is also called upon to contribute to mitigate climate change. Considering the necessary increase of production, staying within planetary boundaries will require to reduce emissions per kg of output and to enhance carbon sinks.

CSA Food Systems

1. More food, in quantity, quality and diversity
2. Adapt to climate change,
3. Contribute to mitigate climate change

More resource efficient systems: use less land, water, inputs to produce more food sustainably

More resilient systems to changes and shocks

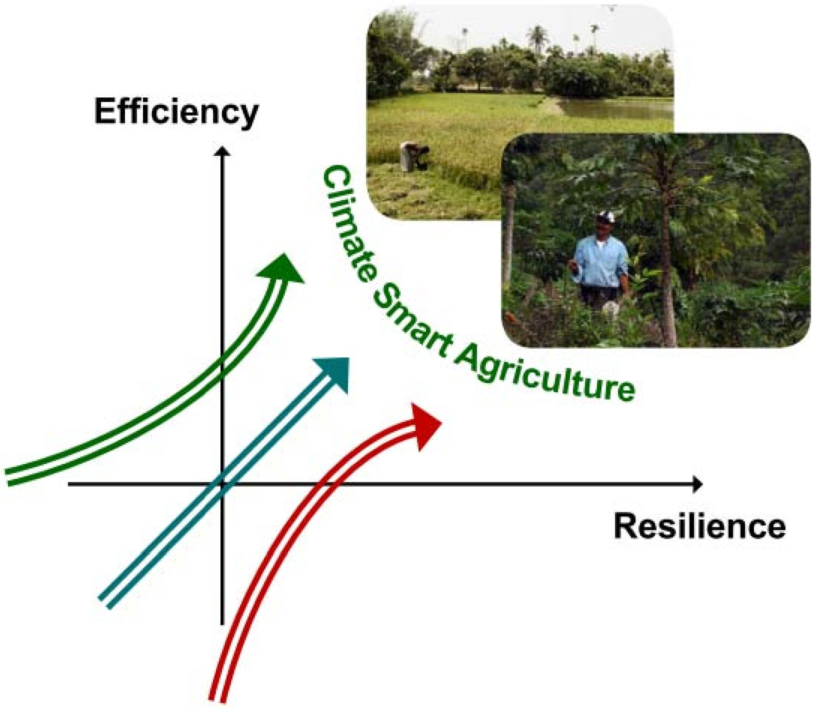
Climate smart agriculture requires radical changes of food systems towards more efficiency in the use of resources and more resilience to shocks. Three production factors have an important influence on total agricultural GHG emissions:

1. **area**, because to bring more surface under cultivation would require either deforestation or grasslands being converted to croplands, which would induce CO2 emissions,
2. **fertilizers** whose production is an important source of CO_2 and which at the field level translate in nitrous oxide emissions,
3. **livestock** which is an important source of methane and nitrous oxide.

Another production factor is essential both to increase productivity and to adapt to climate change: **water**. Efficiency in the use of resources is thus key to CSA.

Resilience can be described as the capacity of systems, communities, households or individuals to prevent, mitigate or cope with risk, and recover from shocks. As climate change will bring new risks, change actual risks and create more uncertainty, building resilience of systems at every level is key to adapting to climate change.

Fig 1 Towards more resource efficient and resilient systems



Implementing CSA

Implementing CSA, towards efficient and resilient food systems, requires comprehensive policies at every level, adequate institutions and proper governance to make the necessary choices. It also requires new financing to address the needs in terms of investments and research and to enable the farmers to overcome barriers to adoption of new practices including up-front costs and income foregone during the transition period.

Policies and institutions

- Governance
- Land tenure
- Risk management
- Genetic resources
- Links to markets

Financing

- Investments
- Research
- Support to farmers

Urea deep placement

The usual technique to apply urea, the main nitrogen fertilizer for rice, is broadcast application. It is very inefficient: 60 to 70% of the nitrogen applied is lost, leading to GHG emissions and water pollution. IRRI the international rice institute, and IFDC, the international fertilizer organization have developed the **urea deep placement technique**. Urea is conditioned in “briquettes” of 1 to 3 grams, which are placed at 7 to 10 cm soil depth after the paddy is transplanted. This technique decreases losses by 40% and increases urea efficiency to 50%. It increases yield by 25% with an average decrease of urea use by 25%.

It has been actively promoted by the Bangladesh Department of Agricultural Extension, with IFDC assistance, and was used in 2009 on half a million hectares, by a million farmers; with planned expansion to 2.9 million more families, on 1.5 million hectares.

The widespread adoption of the technique in Bangladesh had an important impact:

- **Farmers’ income** has increased, thanks to both increased yields and reduced fertilizers’ costs
- **Local jobs** have been created upstream in small enterprises to make the briquettes, often owned by women. There are now 2500 machines in Bangladesh.
- **Jobs** are also created on the field as briquettes are being hand placed: the increased yields more than pays the extra 6 to 8 days of manpower needed per hectare.

Agro-forestry systems in Central America

Since 2000, FAO has initiated special programs for food security with the governments of Guatemala, Honduras, Nicaragua and El Salvador. These programs work together, sharing practices, experiences and results, to improve and develop agro-forestry systems in the subregion**. Agroforestry systems are promoted to substitute traditional slash and burn systems**, particularly on slopes. They are at the same time more efficient and resilient.

Land is almost 5 times more efficient to produce food in agroforestry (cycles of 10 years exploitation + 5 years set aside) than in slash and burn systems (cycles of 2 years exploitation and 14 years of set aside).

Productivity of labour and of capital are also higher in agroforestry systems. **Costs are reduced**, especially in fertilizers, thanks to more organic matter in the soil and better use of nutrients by the plants.

At community level, **diversification of productions** triggers the development of local markets. Families relying on these lands to feed themselves have a much more **varied and balanced diet**.

Agroforestry systems also contribute to **mitigate climate change**, ***directly*** because CO_2 emissions from land clearing are avoided, because fuelwood is grown renewably, and because carbon sinks in biomass and soils are increased, and ***indirectly*** because as they are more efficient in the use of land for the same amount of food produced, they reduce the pressure on forests, and because they use less fertilizer, therefore less N_2O and indirect energy use.

These systems are also much more resilient: less variable yields, more diverse productions, protection against erosion.

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