Contribution
to the Knowledge Action Group (KAG)

of the Global Alliance on Climate-Smart Agriculture (GACSA)

Elements for designing relevant research agenda
based on the CSA Science conference in Montpellier

Based on the main items of the Montpellier Statement
(available here: http://csa2015.cirad.fr/)
and on concluding remarks by the chairman of the scientific committee

Climate-smart agriculture (CSA) involves multiple transformative transitions and a complex set of objectives for which there are newly identified knowledge gaps and a need to build evidence and design trajectories. CSA requires bringing together the climate change impact community and the agricultural research community as well as bridging across the diversity of disciplines in agricultural sciences and environment.

Specifically, CSA aims to contribute to sustainable landscapes and food systems as well as resilience, ecosystem services, or value chains. It intends to mobilize science for achieving the necessary transitions. It does require a system's view and we may still lack clear conceptual models and a collective organization of the science that would help in its development. It is knowledge intensive and it also requires a problem solving and participatory approach.

To address these specificities and concur towards the Sustainable Development Goals (SDGs) with an agenda of solutions attractive to farmers, the following research items were identified. Research efforts should be implemented through international cooperation platforms including varied stakeholders, with an effort to bridge the gaps between disciplines and linking with capacity development.

- To move rapidly from assessment and planning towards implementation of options and monitoring of outcomes, it is essential to work on:
    - The development of consistent metrics
    - The assessment of adaptation, mitigation of greenhouse gas emissions and resilience.
    - The design of options supporting the synergies between the three pillars of CSA and relevant to economic, social and environmental contexts.

- The production of early warning systems.

- The food security pillar of CSA should not be simplified into increasing food supply per unit area. To create synergies with environmental issues and social dimensions of agriculture (including food access, stability, nutrition), a broader approach is required, encompassing landscapes, biodiversity, agroecology and ecosystem services with a strong focus on the resilience dimension of CSA. Nesting agriculture in climate proofed landscapes is part of the solution, but there are many issues with the governance of landscapes and the role of agriculture in value chains. The work on climate smart sustainable food systems should not weaken the food security focus.

- Important themes which contribute to CSA and promote economic sustainability and global security are:
  - agroecology,
  - management of soil use and conservation,
  - carbon sequestration,
  - water resources,
  - biodiversity,
  - minimizing wastes and losses in food systems,
  - greenhouse gas footprint,
  - human nutrition and health.

- Policy, institutional and financing decisions should be part of this research agenda in order to:
  - Increase local and global effectiveness through innovation platforms gathering policy makers, development agencies, civil society and the private sector with research institutions.
  - Raise the profile of agriculture within UNFCCC negotiations and bridge financing instruments for climate change and for agriculture.
  - Take into account the contribution of family farming, as this population is pivotal for addressing economic and social synergies and trade-offs (employment, gender, age, class and ethnicity).
  - Foster the key role of National Agricultural Research and Innovations Systems from low-income countries.

- Specific item on soil carbon: the 4‰ hypothesis

  On-going research results indicate that soil organic carbon sequestration has a strong climate change mitigation potential. An increase of 4‰ per year of present soil carbon stocks could potentially offset all human-induced greenhouse gases emissions. Increased soil carbon content has also a strong potential in terms of improved soil fertility and water retention, thus contributing to climate change adaptation, better resilience and improved yields.

Although this 4‰ hypothesis is clearly conducive to CSA principles, it needs to be verified for different soils, climates, and land-uses, as well as in terms of its adoption potential. An international, inter-disciplinary research program is recommended to address this question.

CIRAD, Montpellier, France, 16 September 2015