GACSA

GLOBAL ALLIANCE FOR CLIMATE-SMART AGRICULTURE

Webinar Summary Report: Practices to Scale-Up Climate-Smart Agriculture

May 19, 2016

Julian Schnetzer

Practices to Scale-Up Climate-Smart Agriculture

Webinar Summary Report

Food and Agriculture Organization of the United Nations (FAO)

Julian Schnetzer

Publishing date: September 2016

Published by:

Food and Agriculture Organization of the United Nations (FAO)

Contact:

Food and Agriculture Organization of the United Nations (FAO)

Viale delle Terme di Caracalla

00153 Rome, Italy

Tel: +39 06 57051

Email：FAO-HQ@fao.org

More information about the Global Alliance for Climate-Smart Agriculture Knowledge Action Group at http://www.fao.org/gacsa/

Acknowledgements

The GACSA Knowledge Action Group Webinar "Promoting Climate-Smart Agriculture Through Extension: An Overview of Existing Tools and Services" held on March 19th, 2016, was organized by the GACSA Facilitation Unit, Food and Agriculture Organization of the United Nations (FAO), and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The organizers would like to thank Tek B. Sapkota (CIMMYT), Dennis Ochola (IITA), Sibyl Nelson (FAO), Rebbie Harawa (AGRA), and Bernard Vanlauwe (IITA) for their presentations. Introductions and conclusion were provided by Federica Matteoli (FAO), facilitation by Sheila Cooke and Christopher Cooke (5 Deep Limited) and Dhanush Dinesh (CCAFS), reporting and summary by Julian Schnetzer (FAO).

Contents

Acronyms

AGRA	Alliance for a Green Revolution in Africa
CA	Conservation Agriculture
CBI	Coffee-Banana Intercropping
CC	Climate Change
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CEST	Central European Summer Time
CIMMYT	International Maize and Wheat Improvement Center
CSA	Climate-Smart Agriculture
CO_2	Carbon Dioxide
CSV	Climate-Smart Villages
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
GACSA	Global Alliance for Climate-Smart Agriculture
GAPAD	Global Action Plan for Agricultural Diversification
GHG	Greenhouse gas
ICRAF	World Agroforestry Centre
ICT	Information and Communication Technology
ILRI	International Livestock Research Institute
ISABU	Institut des Sciences Agronomiques du Burundi
INDC	Intended Nationally Determined Contribution
IPNI	International Plant Nutrition Institute
IRRI	International Rice Research Institute

ISFM	Integrated Soil Fertility Management
IITA	International Institute for Tropical Agriculture
KAG	Knowledge Action Group
N	Nitrogen
N_2O	Nitrous Oxide
NDVI	Normalized Difference Vegetation Index
NGO	Non-governmental organization
NUE	Nutrient Use Efficiency
Q&A	Questions and Answers
RAS	Rural Advisory Services
REDD+	Reducing Emissions from Deforestation and forest Degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
SEA	South-East Asia
SFS	Science Field Shop
SSA	Sub-Saharan Africa
SSNM	Site-Specific Nutrient Management
US$	United States Dollar
VNFU	Viet Nam Farmer's Union
WRI	World Resources Institute

Introduction

In the run-up to the Annual Forum 2016 of the Global Alliance for Climate-Smart Agriculture (GACSA), the GACSA Knowledge Action Group organized a series of two webinars to present selected knowledge products developed since the inception of GACSA (December 2014) to the wider GACSA network and the interested public. The objective of the webinars served both to disseminate the products and to receive feedback and gather inputs on activities and improvements for future work of the GACSA Knowledge Action Group (KAG).

The second of the two webinars – "Practices to Scale-Up Climate-Smart Agriculture" – was held on 19 May 2016, 10:00-11:30 Rome time (CEST), and organized by the Food and Agriculture Organization of the United Nations (FAO), 5 Deep Limited, and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The contents of the webinar were based on Climate-Smart Agriculture (CSA) practice briefs, produced in collaboration by members of the GACSA KAG and available for download at http://www.fao.org/gacsa/resources/csa-documents/en/. The following four practice briefs were presented at the webinar:

- **'Site-Specific Nutrient Management: Implementation guidance for policymakers and investors'**
  A collaboration of CCAFS[1], ILRI[2], CIMMYT[3], WRI[4], and University of Minnesota;
- **'Coffee-Banana Intercropping: Implementation guidance for policymakers and investors'**
  A collaboration of CCAFS, IITA[5], and ISABU[6];
- **'A Gender-Responsive Approach to Climate-Smart Agriculture: Evidence and guidance for practitioners'**
  A collaboration of FAO[7] and CCAFS;
- **'Integrated Soil Fertility Management: Contributions of framework and practices to climate-smart agriculture'**
  A collaboration of CCAFS, AGRA[8], and IITA.

The webinar was attended by 72 participants plus ten hosts/presenters. The appendix provides an overview of the geographical and organizational background and the expectations of the participants. The webinar was structured in an introduction with polls and questions to find out more about participants; four presentations, each followed by Q&A; a panel discussion with the presenters; and a chat-based feedback collection from all participants.

This report presents a summary of the presentations and evaluates the discussions and feedback from participants collected through Q&A on the presentations, the panel discussion and chat boxes dedicated to specific questions around the topic of Climate-Smart Agriculture (CSA) and the contents of the webinar.

[1] CCAFS: CGIAR Research Program on Climate Change, Agriculture and Food Security
[2] ILRI: International Livestock Research Institute
[3] CIMMYT: International Maize and Wheat Improvement Center
[4] WRI: World Resources Institute
[5] IITA: International Institute for Tropical Agriculture
[6] ISABU: Institut des Sciences Agronomiques du Burundi
[7] FAO: Food and Agriculture Organization of the United Nations
[8] AGRA: Alliance for a Green Revolution in Africa

Presentations

1. Climate Smart Agriculture: Site-Specific Nutrient Management

Presented by Tek B. Sapkota (CIMMYT) [Practice brief | Presentation recording]

The big challenge of agriculture is to increase food production in the face of climate change with minimum environmental impact, as projections say that food production would need to increase by 70% between 2005 and 2050 to feed an estimated world population of 9.6 billion people. In consequence, a considerable increase in fertilizer consumption is expected, exacerbating the negative externalities of fertilizer use – in the case of nitrogen (N), the loss to the environment as water pollutants or greenhouse gases (GHG) through leaching, denitrification and volatilization which is particularly high in China, India, and parts of Europe and the United States as estimates of nutrient use efficiency (NUE) and N-balance in agro-ecosystems illustrate. These negative externalities are caused by injudicious use of fertilizers, in particular inappropriate sources of fertilizer, wrong amounts, timing and method of application.

Site-specific nutrient management (SSNM) tries to respond to these deficiencies and reduce negative externalities by promoting fertilizer best management practices. One of the innovative approaches put forward for SSNM is the 4R Nutrient Stewardship, with the four 'R's representing the four components of the approach: 'right source', 'right rate', 'right time', and 'right place'. Each component is guided by scientific principles, such as assessment of nutrient supply and plant demand, and provides practical knowledge, e.g. for the testing of soils for nutrients in order to determine the right rate of nutrient application at a specific site.

Trials in India, comparing common farmers' fertilizer practices with SSNM practices in wheat and rice production, demonstrated that SSNM can provide considerable benefits for CSA. SSNM allowed to reduce N inputs and at the same time increase yields, thus increasing the efficiency of fertilizer use and increasing farmers' incomes. The reduced application of N fertilizer resulted in a direct reduction of GHG emissions – mainly in the form of nitrous oxide (N_2O) – while the increased NUE also resulted in indirect emission reductions expressed as Global Warming Potential (CO_2-equivalent) per unit of grain yield or per US$ net return. This shows that SSNM can be an important tool in realizing the estimated mitigation potential in nutrient management of crops, especially in China and India, and in implementing the intended nationally determined contributions (INDCs) of the 62 countries that included nutrient/cropland management as a mitigation strategy.

A few examples of tools for implementing SSNM were provided. The GreenSeeker is a handheld optical sensor that provides fertilizer recommendations based on the NDVI[9] of the crop canopy. Nutrient Expert (IPNI[10] & CIMMYT) and Crop Manager (IRRI[11]) are examples of software tools to estimate nutrient requirements based on information about crop rotation, management, and yield target. An example of technical tools are simple fertilizer drilling machines that reduce N_2O emissions from fertilizer application.

Several barriers to the adoption of SSNM have been identified, such as farmers' attitude that high nutrient input equals high yields, the lack of data keeping for economic analysis, lack of access to appropriate inputs,

[9] NDVI: Normalized Difference Vegetation Index
[10] IPNI: International Plant Nutrition Institute
[11] IRRI: International Rice Research Institute

machineries and technical knowledge, and counterproductive policies, e.g. fertilizer subsidies only for N in India that lead to imbalance of nutrients. These barriers need to be addressed in order to enable up-scaling of SSNM. In particular, fertilizer subsidies could be targeted to exclusively to vulnerable farmers; the private sector should be involved more on the development of appropriate products for SSNM; and policies should reflect and support SSNM, e.g. by promotion of slow release fertilizers.

Q&A with Tek Sapkota

Q1 (Bernard Vanlauwe/Rebbie Harawa): C sequestration also requires N so some of the N not ending up in the crop is still used well and not impacting negatively on the environment, right?

- Yes, that is correct. That is why the authors recommend a NUE of 80-90% instead of 100%.

Q2 (Julian Schnetzer): Are there hand-held tools like GreenSeeker to determine nutrient requirements other than nitrogen?

- Not aware of any.

Q3 (Emmanuel Kodwo Mensah): How do farming households access guidelines for the use of this practice?

- This depends mainly on the respective government extension agents as the primary source of knowledge for farming households.

Q4 (Julian Schnetzer): Does 4R Nutrient Stewardship also work for organic fertilizers? Are guidelines available?

- 4R Nutrient Stewardship is a holistic nutrient management approach and allows to factor in all sources of nutrients including the various types of organic fertilizers.

Further questions/comments from participants that time did not allow to be discussed:

Dhanush Dinesh: What can GACSA do to address the barriers identified, for example through generation of knowledge?

Nadine: Nutrient management should be based on ISFM, use of both organic sources and mineral fertilizer.

Pham Huu Thuong: What're the difference of Farmer techniques and SSNM? Could farmer show that differences?

Luca Heeb: What are the main challenges you are facing to promote SSNM? Is it the availability of appropriate technology? Or the costs for implementation? The mindset of the farmer? Challenges in knowledge transfer? Etc.

2. Coffee-Banana Intercropping - an intimate relationship with triple wins

Presented by Dennis Ochola (IITA) [Practice brief | Presentation recording]

Coffee-Banana Intercropping (CBI) is a crop production system that fits in with the systems approach to improving livelihoods, meaning that the improvements of overall efficiency of the production system at the plot level also bring benefits for nutrition and incomes at the household level and enhance the enabling factors for sustainable development at the community level.

Profitability analyses in Uganda have shown that among the main staple food crops banana has a much higher return on investment of labor. Also coffee, the main cash crop of the country, has a relatively high return on investment. Thus, in the Ugandan context CBI combines two important crops for household food security and income. It is suitable for communities with limited land resources but requires adequate labor and skill to manage the competition for nutrients, water and light between the crops. The system can be established from scratch or by introducing banana plants in coffee plantations or vice-versa, in any case observing the recommended inter-row spacing and planting density.

CBI provides triple wins for CSA. It increases incomes by at least 50% as compared to monocropping of banana or coffee, while achieving only slightly lower yields than the two monocrops would bring on double of land area. Quality of coffee and banana is also mutually enhanced under CBI. An example for increased resilience through CBI, is the spatial disruption of pest and pathogen dynamics as bananas are no secondary hosts of key coffee pests and diseases. This will become even more important with climate change as distribution and dynamics of pests change. CBI enhances soil carbon and total carbon pools as compared to banana and coffee monocultures and also increases resource use efficiency, thus contributing to climate change mitigation.

Several challenges to the adoption of CBI were identified. Inequality in land ownership and underappreciation of their major contribution to labor in banana and coffee farming, impede the involvement of women in CBI. Many African governments have not yet endorsed coffee intercropping and promote coffee monocropping as a form of modern agriculture. CBI requires a high initial investment of labor and capital and takes 5-10 years to realize economic return, which is beyond the reach of many poor farmers. There is also a lack of site-specific recommendations especially for Africa; most available materials are blanket recommendations for South-East Asia. Nutrient mining can be a common problem as both crops have a high nutrient demand and require skilled nutrient management. And lastly the lack of smallholder-centered strategies and regulations for climate change adaptation and mitigation in agriculture slowed down the uptake of CBI.

Q&A with Dennis Ochola

Q1 (Kathleen Schepp): Would you say that coffee-banana plantations are more profitable and more "climate smart" than coffee agroforestry systems with multiple trees, bananas, citrus, others? That is how Arabica coffee is normally produced in Central American countries.

- The focus of IITA for coffee production systems is on coffee-banana for three reasons: (i) Fast build-up of shadowing canopy by banana (6-12 months); (ii) the benefit of banana production for food security and farm incomes during the 4-5 years before coffee plants reach maturity; and (iii) many trees are secondary hosts of the black coffee twig borer which is a big problem in African coffee production, while bananas plants are not and thus CBI helps to combat the spread of this pest. However, IITA is also doing research on coffee agroforestry systems and currently developing a tool to help farmers select the most suitable tree species for their specific location.

Q2 (Harry Clemens): Did you also study the interaction with shade trees, which could be an additional win?

- This is ongoing work for which a lot of data have already been collected.

Q3 (Kele): How would CBI work in countries where coffee is not usually grown but lots of bananas?

- Also in Uganda, banana production is much higher than that of coffee and very important for food security. So, given the creation of adequate space for coffee plants, the establishment of CBI in existing banana plantations is expected to be possible in such countries.

Further questions/comments from participants that time did not allow to be discussed:

Montcho Cocou Muriel Dorian: for question 2: I can say yes.

Kathleen Schepp: Do you also have experiences with coffee-mango intercropping?

Pham Huu Thuong: Could you explain more about interaction between coffee tree and banana?

Chris: What could be the reasons why maize isn't as profitable as coffee and banana crops?

Bernhard Stormyr (Yara): Important points were made on including farm economics. How can the downstream value chain further support climate smart practices?

Elisabeth Simelton ICRAF Vietnam: The scaling graph in the beginning went from plot, household to community. But how do you factor in that coffee depends largely on outside-community scale?

Emmanuel Kodwo Mensah: With respect to coffee and banana being high consumers for P, and N, would you suggest the combination of CBI and SSNM presented by Tek can have positive impact on farmers' livelihoods?

Maria N, FAO, Rome: Are there any good cases where gender equality was improved in a coffee system?

3. Gender in Climate Smart Agriculture

Presented by Sibyl Nelson (FAO) [Practice brief | Presentation recording]

Gender is a social term that documents the different qualities and characteristics that society applies to men and women. It helps us to understand the different roles and behaviors of women and men in their societal context and how they interact with each other and with the world. For example, research has found how gender and seniority hierarchies shape the processing of climate information among different groups in Uganda.

Worldwide, women in agriculture tend to have less access to resources capital and services as compared to men, a phenomenon called gender gap which is illustrated by the fact that 43% of agricultural work force are made up of women, and yet only 5% of extension resources reach women. In the context of CSA, this can result in low awareness of CSA practices among women and consequently in low adoption rates and sustainability. Experience from Kenya shows, however, that concerted efforts to involve women result in equal or even higher adoption rates among women as compared to men. It is therefore important to take gender into account in CSA projects and programs, i.e. taking a gender-responsive approach to CSA.

A gender-responsive approach recognizes the particular needs, priorities, and realities of men and women and adequately addresses them in the design and application of CSA so that both men and women can equally benefit. This should be monitored by gender-sensitive indicators. Five criteria were identified to determine if a CSA intervention is gender-responsive: (i) Based on gender analysis – roles of men and women, priorities, vulnerabilities, access to information, etc.; (ii) Participation and engagement of men and women in development, adaptation, testing, adjustment of CSA-sensitive practices; (iii) Reduces constraints

to uptake of practice; (iv) Provides immediate benefits for men and women, e.g. reduction of labor time, increased access to/control of inputs and incomes; (v) Provides long-term benefits for men and women, e.g. increased resilience and participation in decision-making. The practice brief provides concrete examples of the application of the gender-responsive approach for several CSA-sensitive practices.

In conclusion it is important to keep in mind that:

- The gender gap in agriculture affects how men and women access and benefit from CSA.
- A gender-responsive approach to CSA addresses this gap by recognizing the specific needs and capabilities of women and men.
- Site-specific CSA practices that are also gender-responsive can lead to improvements in the lives of smallholders (farmers, fishers and foresters), as well as more sustainable results.

Q&A with Sibyl Nelson

Q1 (Mary Nyasimi): There are a lot more women advocating for gender responsive planning than men. It is as if women are only speaking to fellow women. How can we include men in gender dialogues and planning and implementation of gender responsive approaches?

- At the political level there is certainly commitment to gender as demonstrates for example the Paris Agreement that frames gender-responsive approaches in the context of climate change adaptation and mitigation. At the practical/community level, it is crucial to always involve both women and men, because in the end gender is about the interaction between both. By applying an inclusive approach, we can usually overcome resistance to talking about gender and see progress in both men and women.

Q2 (Austin Tibu): Are there any research findings in levels of indigenous knowledge on CSA options between men and women?

- Please refer to section on indigenous knowledge in the Module 18 of the World Bank Sourcebook on Gender: "Gender in CSA".

4. Definition, Implementation, and Adoption of Integrated Soil Fertility Management in Sub-Saharan Africa

Presented by Rebbie Harawa (AGRA) & Bernard Vanlauwe (IITA) [Practice brief | Presentation recording]

Integrated Soil Fertility Management (ISFM) needs to be seen in the context of the intensification of African smallholder agriculture. This is important in both densely populated areas with limited land resources and in forested environments where slash-and-burn agriculture is practiced, as expansion of smallholder agriculture is the main reason for deforestation in Sub-Saharan Africa (SSA).

Three general soil fertility management principles can be derived from long years of research on tropical crop production:

1) Nutrients removed by crops need to be replenished. This can be accomplished by nitrogen fixing legumes for nitrogen, but for other elements mineral fertilizers remain indispensable;

2) For economic and environmental reasons, both organic and mineral fertilizers are best used as efficiently as possible. To achieve the latter,
    a. nutrient supply has to be matched with the demand of the plant;
    b. organic and mineral fertilizers are best applied in combination; and
    c. where specific constraints such as soil acidity occur, additional amendments have to be applied, e.g. liming.
3) Within-farm soil fertility gradients and farmers' resource endowments affect the access of farmers to agro-inputs and their use efficiency. Targeted fertilizer application in response to existing fertility gradients can increase use efficiency.

These observations were combined into the concept of ISFM with the following definition:

"ISFM is a set of soil fertility management practices that necessarily include the use of [mineral] fertilizer, organic inputs, and improved germplasm combined with the knowledge on how to adapt these practices to local conditions, aiming at maximizing agronomic use efficiency of the applied nutrients and improving crop productivity. All inputs need to be managed following sound agronomic principles."

Long-term trials compared ISFM to production systems with no fertilizer input, only mineral fertilizer, or only organic fertilizer, e.g. in maize-soybean rotation systems in Northern Nigeria. The trials found that ISFM provides higher yields, higher yield stability, and increases the soil carbon pool even above levels before cultivation. ISFM can therefore be considered a climate-smart agricultural practice.

Thanks to the related economic benefits, the adoption of ISFM among farmers in SSA was relatively high. AGRA initiatives promoting ISFM in 13 countries in SSA documented the adoption by 1.8 million farmers between 2009 and 2016. Adoption of ISFM was mostly found in combination with rotational or inter-cropping systems, while integration of legumes in the cropping systems was observed more frequently among women farmers.

Notwithstanding the success hitherto, with ISFM being a knowledge-intensive practice, further up-scaling needs to be supported through targeted capacity building, awareness raising and an extension approach working at multiple scales, from farmer-to-farmer training to mass media campaigns, and integrating the specific requirements of smallholder farmers. The creation of enabling conditions is also crucial, such as conducive policies, equitable land tenure systems and access to credit and output markets.

Q&A with Rebbie Harawa and Bernard Vanlauwe

Q1 (Mary Nyasimi): Can Africa increase its crop productivity without use of inorganic fertilizers?

- **Bernard:** No. Certain elements necessarily need to be replenished from mineral fertilizer sources, and so far, no scalable production systems have been observed in SSA that cope without the use of such external inputs. The widespread use of mineral fertilizers in other world regions supports this assumption.

Q2 (Austin Tibu): How can ISFM take advantage of enhanced access to inorganic fertilizers in situations where fertilizer subsidy programs exist?

- ISFM can take advantage by making available and promoting knowledge on soil fertility management along with the subsidies, for example on the combined use of organic and inorganic fertilizers. Subsidy programs also offer the opportunity to distribute seed and thus encouraging the adoption of new corps and their integration in rotations or intercropping, e.g. legumes. Subsidy programs can also enhance the linkage to output markets and thus generate income for farmers, which constitutes an important element of an exit strategy of such programs.

Q3 (Fileccia): Have you done any trials of ISFM under no till conditions?

- **Bernard:** There were no dedicated trials so far. But ISFM and no-till management or Conservation Agriculture (CA) are certainly compatible. Especially under low-fertility conditions, CA often fails as the crop does not produce sufficient biomass to cover the soil with mulches. Hence, ISFM can support CA by achieving higher biomass production and thus allowing proper mulching.

Further questions/comments from participants that time did not allow to be discussed:

Thobela (South Africa): How efficient is ISFM in soil degraded areas, for instance in rural areas where there is also poor rainfall?

Bernhard Stormyr (Yara): We have seen examples on how increased local productivity leads to local over-supply of agricultural produce, and plummeting prices. What has been the experiences of AGRA in spreading ISFM?

Chris: What is the level of adoption of ISFM among people of different economic levels?

Jonas: Applying ISFM seems to be a profitable investment. However it requires efforts of capacity building for knowledge transfer. Do you have experience with successful business models to provide capacity building services to farmers? Are farmers able and willing to pay?

Panel Discussion

The presentations and Q&A were followed by a brief panel discussion with the four presenters.

Q1 (Dhanush Dinesh): What role can GACSA play in promoting CSA practices?

- **Tek Sapkota:** Being a global network, GACSA should promote policies that are conducive for CSA practices with governments worldwide. Examples from India show that policies can cause very negative impacts on the environment by subsidizing the wrong farm inputs or implements. GACSA could help to avoid or improve such policies.
- **Dennis Ochola:** Experiences from Africa confirm this frequent disconnect between policies and the realities of climate change. Old government policies need to be revised and new regulations introduced to support farmers in responding to the climate change-related challenges in sustainable ways, such as avoiding slash-and-burn.

Q2 (Bernhard Stormyr - Yara): Buying fertilizers comes at a (cash) cost, while slash-and-burn is cost-free except labor. How can a more climate-smart approach be incentivized?

- **Bernard Vanlauwe:** When talking about costs of slash-and-burn, we also need to consider the costs caused to society and the environment. Regarding incentives for CSA practices, we have heard about the potential problems with subsidies and we have experienced that it can be difficult that payments for environmental services equitably reach all those smallholder farmers who actually provide those services. Thus, the incentive should be inherent in the practice or technology itself, i.e. it should provide a clear advantage over the common practice for the farmer in terms of net income and food security.
- **Rebbie Harawa:** Profitability of a farming practice or technology is the key factor for adoption by farmers. Profitability depends not only on the productivity of a practice, where most of research focuses on, but also on the availability of output markets. So it is very important when selecting and combining crops in production systems, to select crops that contribute to food security but also match well the output markets.

Q3 (Emmanuel Kodwo Mensah): Women have been shown to receive poor advisory services from extension workers, however, they need the guidelines and information to use these practices. How is your institution reaching out to women with the information (intensive knowledge) so they can improve food security in the context of rapidly changing climate?

- **Sibyl Nelson:** Different approaches should be mentioned in this context. For example, FAO's farmer field school (FFS) model – also often used in youth education – has been successfully used to engage men and women in longer-term learning processes. CCAFS' participatory research approach, applied in multi-year programs with a strong gender component to ensure that men and women participate in formulating the research questions, selection of adaptation options, and in receiving the research results. There are still considerable gaps between these project-based practical approaches and the policy making scale, especially with respect to the different needs of men and women. But improvements can be seen, e.g. the requirement of the Green Climate Fund that participating organizations have gender policies in place, which are expected to enhance the adoption of gender-sensitive approaches at the policy level.

Further questions/comments from participants that time did not allow to be discussed:

Jonas: There seem to be plenty of technologies out there and their business case has been proven. What business models work to bring this technology to smallholder farmers?

Maria N, FAO, Rome: @Tek: Improved use of fertilizers often improves food security, reduces need to convert other areas into crop production. What is the rough estimation of global climate change mitigation potential taking into account the reduced land conversion?

Katherine Foster: How can we shift EU innovation and knowledge can be integrated to help meet specific barriers?

Catherine: Demystify the term climate-smart agriculture! It usually sounds like something very alien to outsiders.

Thobela: Can livestock manure work as efficiently as inorganic fertilizers if used as an alternative?

Taryn: Both Site-Specific Nutrient Management and Integrated Soil Fertility Management would lead to farmers using less fertilizers. This would be in contradiction to the objective of agro-chemistry corporations that have a lot of geo-power. How are they included in the mainstreaming of these CSA practices?

Laura: What have we learned from the past 40+ years of agricultural research for development that can be applied successfully to get wide scale adoption of CSA technologies?

Feedback collection

Further to the Q&A sessions after presentations, feedback from the participants was collected at the end of the webinar through chat boxes asking the following questions:

- What is one phrase or message that stands out for you from today's webinar?
- What has challenged your thinking today?
- What outcome would you like to see coming out of the GACSA Forum in Rome in June?
- Synthesising everything you learned today, what is the key message you would like to send to the GACSA Annual Forum in June?

The feedback on these questions is evaluated in the subsequent section. The full list of participants' answers can be found in the appendix.

Summary of discussions

The webinar participants actively engaged in discussions. Summarized below are the main thematic clusters:

Building the business case for CSA practices

The **profitability** of CSA practices, i.e. increased net income as compared to the commonly used practices, was identified as the main factor for their adoption. In this context, it was noted that the lack of pricing of externalities in farm economics, e.g. avoided slash-and-burn, was a missed opportunity to strengthen the business case for CSA practices. It was highlighted that transformation of increased productivity into increased incomes strongly depends on farmers' access to the appropriate **output markets**, as experience from Africa and South-East Asia shows.

Building a supporting framework for CSA practices

Participants acknowledged the benefits of the presented practices. At the same time many noted the gap between research findings and the farmers' fields and the need to identify **effective extension models** to close this gap in order to achieve higher adoption at a larger scale. This is especially true for knowledge-intensive practices such as ISFM, for which an extension approach was proposed that works at multiple scales, combing e.g. mass media campaigns to raise the general awareness about the practice and its benefits with field-level methods like farmer-to-farmer training to build technical capacities of individual farmers. A webinar on extension and CSA with the title "Promoting Climate-Smart Agriculture through Extension: An Overview of Existing Tools and Services" was organized by the GACSA KAG; the recordings of the presentations and a summary report of the event can be accessed at http://www.fao.org/gacsa/webinars/en/.

Need for a conducive policy environment for CSA

Several examples were given of national policies that impede the adoption of CSA practices, such as the promotion of monocropping, unbalanced fertilizer subsidies and in general outdated agricultural policies that do not take climate change into consideration. It was suggested that GACSA should support governments to develop **policies that enable the adoption of CSA**.

Mainstreaming gender in CSA

Gaps at the policy level were also attested in relation to gender. International agreements and instruments such as the Paris Agreement and the Green Climate Fund call for gender-responsive approaches and policies, which may create a certain pressure on countries to adopt conformable **gender policies** in order to access climate finance.

Combined use of organic and inorganic fertilizer

Discussions and comments revealed a great interest in the potential of organic fertilizers to support sustainable intensification in crop production and even replace. It was clarified that SSNM and in specific 4R Nutrient Stewardship can factor in organic nutrient sources, while ISFM actually requires the **combination of organic and inorganic sources** and, in trials, also achieved higher yields than by using only one or the other. However, it was also argued that organic fertilizers could not completely replace inorganic fertilizers

as certain nutrients could be replenished only from inorganic sources. The specific input choices and combinations will vary across sites.

Diversification of cropping systems

Examples in the presentations on CBI and ISFM illustrated the potential of intercropping and crop rotations to achieve higher overall farm income and benefits for soil fertility and carbon storage at the same time. There was a general notion among participants that agriculture should **move from monocropping to more diverse cropping systems**. It was also suggested that GACSA should focus on the diversification of crops and cropping systems in line with the Global Action Plan for Agricultural Diversification (GAPAD) to achieve its objectives.

Recommendations

The evaluation of the discussion and feedback from participants suggests the following recommendations for the future work of the GACSA Knowledge Action Group:

- Assessments of practices from a CSA perspective should always address the aspect of profitability as an important factor of adoption.
- Efforts to encourage the adoption of recommended CSA practices or new crops should always include an assessment of the output markets to ensure producers' adequate access to markets and profitable commercialization of increased yields or new crops.
- Efforts to scale up CSA practices should be combined with efforts to create a conducive policy environment, to mainstream gender, and the provision of supporting services such as extension services.
- CSA practice briefs and related knowledge products should discuss the requirements and possible issues of the enabling environment for effective adoption of the practice, in order to draw the attention of policy and decision makers considering a given practice to national policies or programs that may be contrary to the practice and require adjustments.

Appendix

Webinar participants - profile and expectations

Number and geographical background of participants

Total number of participants: 82

of whom hosts/presenters: 10

Interest and expectations of participants

a) What is your current contribution to climate-smart agriculture?

Michel Midré: Advise to development projects / trainings in Africa

Dr Noman Qadir UAE: Just learning

Germana Borsetta: support to GACSA for France Case study

Harry Clemens: Hivos is implementing/ supporting various CSA projects in Africa, Latin America and South East Asia

Yen CCAFS-SEA: coordinate Climate-Smart Villages (CSV) implementation in South-East Asia

Bernhard Stormyr (Yara): Optimizing use of inputs; low-carbon inputs; LCA and Carbon Footprinting capacity; improving agricultural productivity

Catalina Berger: I am a trainer for CSA (focus on Africa)

Salvatore Virdis: I want to see if my geospatial expertise can contribute to CSA

Kathleen Schepp: doing participatory climate risk and vulnerability assessments and develop adaptation and mitigation strategies for small-scale farmers

Tek Sapkota: Involved in designing, testing and promoting climate smart agriculture

Onno Giller: PhD Candidate (Wageningen University and IITA-Uganda) on scaling CSA practices in the coffee sector on Uganda and Rwanda

Becky Willson: Supporting UK farmers to reduce emissions

Minh: involve in CSV implementation in Vietnam

Berns Joven: Doing communication work on CSA and CSVs in SEA

Katherine Foster: EU Climate-KIC innovation on Sustainable Land Use including a CSA booster - trying to scale innovations

E Torquebiau: Co-convener of GACSA's Knowledge Action Group

Bernard Vanlauwe/Rebbie Harawa: promoting CSA practices for smallholder farmers such as ISFM

Roshan Lal Tamak: My organization OLAM is running a sustainable sugarcane program in collaboration with IFC, SOLIDARIDAD and Unilever Foundation in India covering about 22000 small holders.

Laura: supporting CCAFS to help countries adopt CSA policies

Ponzio Pilato: Working on estimate of GHG emissions at global level according to IPCC guidelines, especially on fires

Norman Martin: Research assistant involved in CCAFS Big Facts website

Mariola Acosta: I'm a PhD candidate at Wageningen University & IITA Research fellow working on Gender and CSA Policy-Making in Uganda and Tanzania

Montcho Cocou Muriel Dorian: I advise project to develop CSA.

Kerstin Linne - Green Line Consulting: Working with smallholder farmers on adaptation and looking into how and if this can / should be part of voluntary sustainability standards.

Pham Huu Thuong: I am maintaining Agroforestry trials in highland. One of that project focus on climate change adaptation.

b) In the context of climate-smart agriculture, what are you curious about?

Salvatore Virdis: I would like to understand more about the CSA concept

Dr Noman Qadir UAE: Current Knowledge

Michel Midré: The relation with agroecology

Katherine Foster: We would like to know where best to put our resources in terms of CSA innovations - what are the specific needs and barriers.

Germana Borsetta: means to overcome gaps

Maria N, FAO, Rome: What are the main challenges farmers, extension agents and planners are facing at different scales?

Ponzio Pilato: I would like to get more info to understand if it's in any way different from good agricultural practices for a sustainable agriculture

Onno Giller: I am curious about how CSA practices can be bundled to fit context specific needs of farmers depending on the impact of current and future changes in climate.

Kathleen Schepp: I would like to understand methodologies and what is working and what is not in order to do climate adapted and climate friendly agriculture business

Laura: The relationship with achieving food security

Mariola Acosta: I'm interested in understanding better how intra-household relations shape adoption of CSA

Becky Willson: How to embed CSA practices in day to day business management for farmers and make it more mainstream, how we can communicate better?

Norman Martin: Contribution of livestock to adaptation and mitigation, as well as conservation agriculture

Berns Joven: more experiences and methodologies that effectively facilitated the multilevel out-scaling and up-scaling of CSA; how communication was effectively tapped to do the out-scaling and up-scaling

Kaiyun Xie: How to integrate the elements (seed, varieties, soil, water, etc) for the production of a particular crop

Kerstin Linne - Green Line Consulting: How do you react to the criticism around CSA (greenwashing) and where do you draw the line between CSA and pure adaptation?

c) What would you like to gain from the webinar today?

Maria N, FAO, Rome: Better understanding how practice briefs can help practitioners working with farmers.

Dr Noman Qadir UAE: Knowledge, networking

Salvatore Virdis: I want to expand my knowledge on CSA

Harry Clemens: learn from other experience and use it to improve our own work

Michel Midré: Get examples to use for practitioners in the field

Catalina Berger: New developments, case studies, practical examples

Germana Borsetta: capitalization of knowledge

Becky Willson: networking, a greater understanding of more global activities and sharing best practice

Katherine Foster: clearer ideas of where we should be focusing for our CSA booster- across the value chain

Minh: Experience in CSA implementation

Kaiyun Xie: Learn the experiences of soil fertility management in SSA

Yen CCAFS-SEA: challenge in scaling and experiences

Emmanuel Kodwo Mensah: Learn more about what others are doing on CSA especially on gender

Niccolò: Challenges, opportunities and key elements to consider for scaling up practices at country and agro-ecological zone levels

Kathleen Schepp: learn from practical experiences, tools, methodologies, concepts

Kele: expanding knowledge and how to work together as different professions in the agricultural sector

Norman Martin: Technical knowledge on conservation practices for smallholder producers in soil and water management

Laura: understand how CSA can be scaled up and out

Ponzio Pilato: knowledge

Montcho Cocou Muriel Dorian: I want to share and expand knowledge

Bernhard Stormyr (Yara): A better understanding of what is the common ground across stakeholders on the conceptual thinking around CSA

Onno Giller: See what I can learn about scaling up CSA from a wider network ☺

Mariola Acosta: Key gender considerations for effective CSA scale-up

Participants' comments on specific questions asked at the end of the webinar

a) What is one phrase or message that stands out for you from today's webinar?

Emmanuel Kodwo Mensah 2: very interesting and educative

EJ: Intercropping efficiently can help with CSA goals

Onno Giller: That although we have a lot of knowledge and understanding about CSA, clear ideas about how to scale up CSA are still few and far between

Jonas: Numerous practices and technologies are available and have already proven benefits, the challenge is to develop models to increase their uptake, especially by smallholder farmers.

kimbowarichard: CSA is a potential to build resilience of the poor vulnerable farmers

Michel Midré: The interactions are at the economic, social and technological levels

Austin Tibu: upscaling CSA requires multifaceted approaches

Harry Clemens: mono-cropping is still dominating view and needs to be changed; diversity and intercropping is key for CSA

EJ: Agro-biodiversity is important especially neglected and underutilized species that can grow on marginal lands with low input

Catherine: CSA - needs necessary policy support, address gender issues and need for intensive awareness campaigns!

Dennis Ochola: Repackaging CSA

b) What has challenged your thinking today?

Michel Midré: The need to have and disseminate appropriate knowledge

Dennis Ochola: CSA as an integrated approach

Jonas: The lack of pricing in externalities into on farm economics weakens the business case of CSA practices

Onno Giller: Whether we really have the expertise to effectively scale up CSA, while the pressure of Climate Change is expediting our need to do exactly that

Austin Tibu: bringing in CSA in societies using approaches with a number of externalities, e.g. slash and burn

EJ: That intensification can work provided limiting factors like water can be resolved

Catherine: the challenges of scaling up and out of CSA for small-holders for food and income security

Dennis Ochola: Paradigm shift from research fantasies about CC towards addressing smallholder farmer realities

Sibyl Nelson: how can we translate practices from one location to another?

c) What outcome would you like to see coming out of the GACSA Forum in Rome in June?

kimbowarichard: More focus in CSA for SS-Africa

Benard: how government and private sector work together to scale CSA practices

Sibyl Nelson: Discussion of better linking farmers' experiences and policymaking

Jonas: What are viable business models to provide services to smallholders leading to the application of CSA?

Onno Giller: The role of science in interacting with the wider stakeholder groups in promoting the scaling of CSA in a wide array of value chains

Dennis Ochola: Multiple stakeholder engagement to revive the discussion on the intersection between Gender, Climate change and Food Security from the context of CSA

Austin Tibu: clear roadmap to demystify CSA in both policies and strategies in agriculture.

Harry Clemens: how can we incentivise more appropriate organic fertiliser use to counter the bias of subsidies for inorganic fertilisers?

Michel Midré: To take care of knowledge transfer from the scientist to the farmer.

Elisabeth Simelton ICRAF Vietnam: more successful and unsuccessful examples of scaling out beyond communities that accounts for linking markets (CSA adoption is much connected to being able to sell, at least in SEA)

Nadine: outcome of research results and proven best practices need to be transferred into easy accessible practices for smallholder farmers

Catherine: road map to create awareness and demystify CSA to get buy in from governments, private sector etc.

d) Synthesising everything you learned today, what is the key message you would like to send to the GACSA Annual Forum in June?

Michel Midré: Support all means of knowledge exchanges, repeatedly

Harry Clemens: mono-cropping is still dominating view and needs to be changed; diversity and intercropping is key for CSA

Tek Sapkota: Influence governments for CSA-responsive policy

Nadine: soil fertility and climate smart soil management is the key for sustainable agricultural intensification

Jonas: New, innovative approaches are needed to increase farmers' access to knowledge and finance.

Onno Giller: Scaling should not be an after-thought, but a planned initiative through multi-stakeholder processes

EJ: Let's focus on diversification of systems and crops as one of the major vehicles for GACSA delivery through GAPAD goals.

Austin Tibu: We still need inorganic fertilizers to upscale CSA in SSA.

Catherine: CSA is not easy but it's possible and do-able and should be supported at all levels

EJ: GAPAD = Global Action Plan for Agricultural Diversification… In an era of climate change gapad.org

Dennis Ochola: Let's continue talking about fine-tuning CSA approaches

E Torquebiau: How do we make sure that CSA does not repeat the mistakes of industrial agriculture e.g. air pollution in Europe?