# 2012 Technical Report per Activity

Each Program Participant must provide a small remark against each activity/deliverable to indicate the status of the activity (2-4 sentences required per activity) using the form below. Updated data from the current partners is also required.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

| Activity No. 8 | | | |
|---|---|---|---|
| **Activity title** | Collection of agronomic & management data for past & current on-farm research sites in IGP (rice-wheat-maize based systems, CSISA, RWC) and prioritize filling the gaps (short and long term data collection + reviewing long term trials). | | |
| **CCAFS Objective** *(select from drop list)* | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 1.1.1 2012 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Collect, analyse and synthesize short-term as well as long-term databases on different crop management technologies across different production systems and ecologies of IGP. | |
| | **Objective 2** | Develop adaptation recommendations. | |
| | **Objective 3** | Identify research gaps under different crop and resource management scenario. | |
| **Activity status** | Partially completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Data have been gathered from various long-term trials (from completed as well as on-going farmers' field and on-station trials) in different parts of Nepal, India and Bangladesh. Compilation of data from these different trials is underway. Wheat production data under different cropping system has been compiled and same is underway for rice and maize.<br>• To evluate the long-term benefits of CA at a systems level, three permanent long-term trials have been established (in Ludhiana, Samastipur and Jabalpur).<br>• Many on-farm trials to evaluate various CA techniques (tillage, residue management and crop sequencing) have been established in Punjab, Haryana, UP, Bihar and Jharkhand of India and also in Terai of Nepal and in Bangladesh. Some of these trials are conducted under the aegis of CCAFS while some of them are in collaboration with other regional project (i.e. CSISA, ACIAR, IFAD project).<br>• The information on agronomic management practices has been synthesized and published:<br>- Sharma A.R., Jat M.L., Saharawat Y.S., Singh V.P. and Singh R. 2012. Conservation agriculture for improving productivity and resource-use efficiency: Prospects and research needs in Indian context. Indian Journal of Agronomy, 57: 131-140.<br>- Chauhan, BS; Mahajan, G; Sardana, V; Timsina, J and Jat, ML. 2012. Productivity and sustainability of the rice-wheat cropping system in the Indo-Gangetic plains of the Indian Sub-continent: Problems, opportunities and strategies. Advances in Agronomy, 117, DOI: http://dx.doi.org/10.1016/B978-0-12-394278-4.00007-6<br>- Jat M.L., Saharawat Y.S., Gathala M.K., Sidhu HS., Jat, R.K., Malik R.K., Kamboj B.R., Gupta Raj, Sayre Ken and Gerard Bruno 2012. Conservation agriculture in Asia: Status and Prospects. In: Extended summaries (Lead Paper) Vol 1, Third International Agronomy Congress: Agricultural Diversification, Climate Change management and Livelihoods, Nov 26-30, 2012, New Delhi, India, p 67-69.<br>- Kumar Brijesh, Dwivedi B.S., Meena M.C., Majumdar K., Jat M.L. and Hassan M. 2012. Site-specific nutrient management approaches for N response in wheat under rice-wheat cropping system. In: Extended summaries, Vol-3, Third International Agronomy Congress, Agricultural Diversification, Climate Change management and Livelihoods, Nov 26-30, 2012, New Delhi, India, p 906-907.<br>. | | |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Meta-database: Agronomic data collected and curated for past & current on-farm research sites in IGP (rice-wheat-maize based systems; CSISA, RWC) | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Reports, publications | Synthesis of database and develop report/publications | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Workshops | Data management & analysis workshops | 2012 | Completed | Other |
| Capacity | Training of researchers, extension personnel on climate resilient practices. | 2012 | Completed | Other |
| Communication products | Bulletin on climate resilient practices. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Reports, publications | Scoping study for climate change adaptation in IGP. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |

NARES - National agricultural research and extension services

| Acronym | Name |
|---|---|
| ICAR | Indian Council of Agricultural Research |

| Contact Point Full Name | Contact Point Email |
|---|---|
| Dr S Ayyappan | dg.icar@nic.in |

| Acronym | Name |
|---|---|
| BARI | Bangladesh Agricultural Research Institute |

| | | | | |
|---|---|---|---|---|
| **Current Partners** | NARES - National agricultural research and extension services | **Contact Point Full Name**: Dr Mondal | **Contact Point Email**: dg.bari@bari.gov.bd | |
| | NARES - National agricultural research and extension services | **Acronym**: NARC | **Name**: Nepal Agricultural Research Council | |
| | | **Contact Point Full Name**: Dr Dil Bahadur Gurung | **Contact Point Email**: gurung.dilbahadur@yahoo.com | |
| | NARES - National agricultural research and extension services | **Acronym**: PARC | **Name**: Pakistan Agricultural Research Council | |
| | | **Contact Point Full Name**: Dr Iftikar Ahmed | **Contact Point Email**: iftahmad@gmail.com | |
| | CG - CGIAR Center | **Acronym**: IRRI | **Name**: International Rice Research Institute | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | CG - CGIAR Center | **Acronym**: ILRI | **Name**: International Livestock Research Institute | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | CG - CGIAR Center | **Acronym**: IFPRI | **Name**: International Food Policy Research Institute | |
| | | **Contact Point Full Name**: Dr PK Joshi | **Contact Point Email**: p.joshi@cgiar.org | |

## Activity No. 9

| | | | |
|---|---|---|---|
| **Activity title** | Collection of agronomic & management data for past & current on-farm research sites in SIMLESA research sites. | | |
| **CCAFS Objective** *(select from drop list)* | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 1.1.1 2012 (1) |
| **Activity objectives** *(what the activity aims to achieve)* — **Objective 1** | Test and develop productive, resilient and sustainable smallholder maize-legume cropping systems and innovation systems for local scaling out across ecologies of EA. | | |
| **Activity status** | Partially completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Agronomic data collected on current on-farm exploratory trials. This process is on-going and will be repeated every season. Due to delays in hiring new staff curation of past data has only just begun.<br>• Current data synthesized and reports/publications produced.<br>• Data management completed for use in APSIM modelling.<br>• Conducted one writeshop under EC-IFAD. Planned writeshop in 2013.<br>• Two trainings completed: one on APSIM modeling (Harare) and climatic risk management (Morogoro, Tanzania). | | |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Meta-database: Agronomic data collected and curated for past & current on-farm research sites in EA (maize-legume based systems; SIMLESA, EA Cereals Network). | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Reports, publications | Synthesis of database and develop report/publications. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Workshops | Data management, analysis and writeshop workshop. | 2012 | Completed | Other |
| Capacity | Training of researchers, extension personnel on APSIM modeling and climatic risk management. | 2012 | Completed | Other |

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|---|---|---|---|---|
| | NARES - National agricultural research and extension services | **Acronym**: EIAR | **Name**: Ethiopian Institute of Agricultural Research | |
| | | **Contact Point Full Name**: Mekonnen Sime | **Contact Point Email**: mekonnensm@yahoo.com | |

| | | | | |
|---|---|---|---|---|
| **Current Partners** | NARES - National agricultural research and extension services | **Acronym** KARI | **Name** Kenya Agricultural Research Institute | **Contact Point Full Name** Charles Nkonge / **Contact Point Email** CNkonge@kari.org |
| | NARES - National agricultural research and extension services | **Acronym** DRD | **Name** Department of Research and Development | **Contact Point Full Name** Lucas Mugendi / **Contact Point Email** Lmugendi@yahoo.com |
| | RO - Regional Organization | **Acronym** ASARECA | **Name** Association for Strengthening Agricultural Research in Eastern and Central Africa | **Contact Point Full Name** Lydia Kimenya / **Contact Point Email** L.kimenya@asereca.com |
| | CG - CGIAR Center | **Acronym** ICRISAT | **Name** International Crops Research Institute for the Semi-Arid Tropics | **Contact Point Full Name** Said Sim / **Contact Point Email** S.Silim@cgiar.org |
| | ARI - Advanced Research Institution | **Acronym** ARC | **Name** AGRICULTURAL RESEARCH COUNCIL | **Contact Point Full Name** Yolisa Pakela-Jezile / **Contact Point Email** PakelaY@arc.agric.za |
| | ARI - Advanced Research Institution | **Acronym** QAAFI | **Name** Queensland Alliance for Agriculture and Food Innovation | **Contact Point Full Name** Daniel Rodriguez / **Contact Point Email** d.rodriguez@uq.edu.au |

## Activity No. 10

| | | |
|---|---|---|
| **Activity title** | | Curation and analysis of historical wheat germplasm evaluation data. |
| **CCAFS Objective** *(select from drop list)* | | 1.1 Adapted farming systems |
| **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | | 1.1.1 2012 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Data curation. |
| | **Objective 2** | Set up a data curation system so that incoming data is automatically curated. |
| | **Objective 3** | Analyse the data to provide trial by variety means that can be subsequently used for other milestones. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • Data curation R scripts have been written and tested on 4 of the 5 international wheat nurseries planned (ESWYT; SAWYT, HTWYT and IDYN).<br>• Automation of the data curation system has not been completed due to delays in staff recruitment and will be completed in 2013.<br>• The trial-by-variety means are available for 4 of the 5 IWIN nurseries, ESWYT, SAWYT, HTWYT and IDYN. The ITYN will be completed in early 2013. It is important to note that the IWIN database is dynamic (data are being returned and updated on a weekly basis) and hence the data curation process is an ongoing activity as multi-year datasets are provided to CIMMYT from partners.<br>• Data can be made available on agtrials.org in 2013 in agreement with CIMMYT´s data sharing policy. |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | ESWYT, SAWYT, IDYN and HRWYT data curated | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Data | Locations in IGP and EA identified where there is consistent data reporting | 2012 | Uncompleted | Database (*.sql, *.mdb, etc) |
| Data | First analyses implemented with relevance to IGP | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |

## Activity No. 11

| | | |
|---|---|---|
| **Activity title** | | Matching of historical maize & wheat germplasm evaluation data with GIS data and current weather data |
| **CCAFS Objective** *(select from drop list)* | | 1.1 Adapted farming systems |
| **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | | 1.1.1 2012 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | To inform breeders of future developments of mega environments and the nursery sites representing them. |
| | **Objective 2** | Create database for crop modeling. |
| | **Objective 3** | To inform breeders of future developments of mega environments and the nursery sites representing them. |

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|---|---|
| **Activity status** | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Purchased daily rainfall data for India covering 50 years. Procured daily station data for sites in East Africa. Daily climate data generated in joint research with Stanford for maize and wheat research linked to nursery sites. Curated 1999-2010 maize trial dataset for East and Southern Africa. Extracted monthly rainfall data 1950 to 2009 for trial sites as well as other GIS data layers, soils, aridity index, elevation etc and integrated in Geodatabase based on trial site locations<br>• Two consultants were recruited to work on filling gaps, identifying duplications and correcting location precision for maize and wheat nursery trials respectively. As a final step the updated and cleaned sites list will be shared with the nursery sites managers for both crops who will then forward to the trial coordinators. An online location, precision, revision and correction entry tool based on google maps developed for a similar exercise for a Mexican maize project has been adapted to the global trials and will be utilized to get a final feedback and corrections from the people running the nursery trials in their respective countries<br>• Current and future analogues created for wheat nursery trial sites, maize pending the georeferencing activities.<br>• Worked with Agtrials personnel to create batch upload format for meta, location and contact data for all nursery trial sites. Manual upload of a number of trialsites started to evaluate process and discuss format and content with agtrials. Once formats are agreed upon batch upload can proceed. |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | GIS-referenced database: Historical maize & wheat evaluation data matched with current climate and soil data in the IGP and EA (global) | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Data | Correction of georeferenced location precision | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Model tools and software | Current and future analogue layers created for all sites | 2012 | Completed | Other |
| Data | Metadata created discribing time series and location data available | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| CRP - Challenge Research Program | | CRP 3.1 Wheat | Victor Kommerell | V.Kommerell@cgiar.org |
| CRP - Challenge Research Program | | CRP 3.2 Maize | David Watson | D.Watson@cgiar.org |

## Activity No. 12

| | | |
|---|---|---|
| **Activity title** | | Suitable international maize trial data identified, collated and relevant climate / environment data of these trials reconstructed or accessed and analysis initiated. |
| **CCAFS Objective** *(select from drop list)* | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 1.1.1 2012 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Historical datasets from EA collated. |
| | **Objective 2** | Historical environmental data sourced and collated. |
| | **Objective 3** | Analysis of trial and environmental data. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • Data from regional trials (EHYB and ILHYB) at 64 locations in East and Southern Africa (2009-2011 and 2001-2012, respectively) have been curated into FieldBook. The quality of trial data was tested at each location by estimating the broad-sense heritability (H). Trials with H less than 0.2 were removed from the curated file. GIS co-ordinates and trial management (optimal, managed drought, random drought, and low nitrogen) were manually assigned to each trial.<br>• Where possible corresponding environmental data (climatic, soil and management) were collected however in many cases data on soil and climatic conditions were not routinely collected by CIMMYT breeders and/or national partners. To address this, missing environmental data are now being collected from either the appropriate authorities or generated with NASA power using a correction factor based on previously measured data in the region.<br>• Maize yield data can be made available on Agtrials.org in 2013 in agreement with CIMMYT´s data sharing policy. SAS mixed model and PLSR programs have been written for initial data analysis identify year-to-year variability within locations and incorporate climate variability into the models. |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Framework for international maize trial meta database developed and germplasm-related data curated | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| NARES - National agricultural research and extension services | KARI | Kenya Agricultural Research Institute | Charles Nkonge | CNkonge@kari.org |
| NARES - National agricultural research and extension services | EIAR | Ethiopian Institute of Agricultural Research | Mr Berhanu Tadesse | btadde@yahoo.com |

| | | | | |
|---|---|---|---|---|
| | | **Acronym** | **Name** | |
| | Donors - Donors | BMGF | Bill & Melinda Gates Foundation | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | Dr Gary Atlin | gary.atlin@gatesfoundation.org | |
| | | **Acronym** | **Name** | |
| | RO - Regional Organization | DTMA | Drought Tolerant Maize for Africa | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | Dr Tsedeke Abate | t.abate@cgiar.org | |

| **Activity No. 14** | | | | |
|---|---|---|---|---|
| **Activity title** | | Data compilation to identify coping and adaptation strategies of farmers and the poor to manage future climate outcomes | | |
| **CCAFS Objective** *(select from drop list)* | | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 1.1.3 2013 (3) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Compile gender-disaggregated data to identify coping and adaptation strategies of farmers and the poor to manage future climate outcomes. | | |
| **Activity status** | | Partially completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • The SIMLESA database captures information for 613 small-scale maize-legume farmers in 6 districts (Bungoma and Siaya in Western region; Embu, Meru and Imenti South in Eastern region). The on-going analysis under CCAFS draws on this database of which approximately 20% of the sampled households are female-headed whereas 50% are below 1 USD poverty line and food insecure.<br>• Bivariate and multivariate probit models were used to analyse determinants of adaptation and risk-reduction actions as well as choice of a particular strategy for each type of climate risks for different types of farmers. Preliminary analysis has been completed to identify the most frequent and important climate-related risks, ex-post adaptation and ex-ante risk-reduction strategies.<br>• In addition to the SIMLESA database, CIMMYT is currently conducting a panel national survey covering 1342 households representative of Kenyan maize farmers in 6 agroecological zones. The aim is to collect more in-depth data on climate change awareness, access to climate information, effects of climate shocks on household income and food production, details on adaptation strategies in the past, anticipation of possible future climate risks and mitigation strategies undertaken. | | |

| **Deliverables status** *(You may add any unexpected deliverable)* | **Type** | **Description** | **Year** | **Status** | **Format** |
|---|---|---|---|---|---|
| | Data | Household and community surveys and compiled gender-disaggregated data in EA (linked to SIMLESA and DIVA) | 2012 | Completed | Database (*.sql, *.mdb, etc) |
| | Reports, publications | Publication on the coping and adaptation strategies of smallholder maize farmers in EA. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |

| **Current Partners** | | | | |
|---|---|---|---|---|
| | | **Acronym** | **Name** | |
| | CG - CGIAR Center | SIMLESA | Sustainable Intensification of Maize-Legume Systems for Food Security in Eastern and Southern Africa | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | Dr M.Mekuria | M.Mekuria@cgiar.org | |
| | | **Acronym** | **Name** | |
| | CG - CGIAR Center | DIVA | Diffusion of Improved Varieties in Africa | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | | | |
| | | **Acronym** | **Name** | |
| | NARES - National agricultural research and extension services | KARI | Kenya Agricultural Research Institute | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | Charles Nkonge | CNkonge@kari.org | |
| | | **Acronym** | **Name** | |
| | AI - Academic Institution | | Egerton University | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | | | |
| | | **Acronym** | **Name** | |
| | GO - Government office/department | DRD | Department of Research and Development | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | Lucas Mugendi | Lmugendi@yahoo.com | |
| | | **Acronym** | **Name** | |
| | AI - Academic Institution | SUA | Sokoine University of Agriculture | |
| | | **Contact Point Full Name** | **Contact Point Email** | |
| | | | | |

| | | Acronym | Name |
|---|---|---|---|
| | NARES - National agricultural research and extension services | | Hawassa University |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | | |
| | | **Acronym** | **Name** |
| | Select a partner. | EIAR | Ethiopian Institute of Agricultural Research |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | | |

## Activity No. 15

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|---|---|---|---|---|
| **Activity title** | | Analysis and modeling of wheat trial data to identify climate ready traits/ideotypes, and analogue sites in climate vulnerable regions with the medium-term objective of developing phenotyping platforms with NARS collaborators. | | |
| **CCAFS Objective** *(select from drop list)* | | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 1.1.3 2014 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Identify appropriate traits and combinations of traits for wheat to be adapted to future warmer climates. | | |
| | **Objective 2** | Define the key characteristics of sites that will be analogues for future environments in climate vulnerable regions. | | |
| | **Objective 3** | Developing phenotyping/breeding platforms with NARS collaborators at analogue sites. | | |
| **Activity status** | | Partially completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • Collated weather, WISE soil input data, and experimental field data for 25 global regions in DSSAT format and calibrated DSSAT-CERES-Wheat model for 12 CIMMYT benchmark genotypes (Gbegbelegbe et al., forthcoming)<br>• Conducted sensitivity analysis of DSSAT-CERES-Wheat model response to heat and carbon dioxide (Chung et al., forthcoming)<br>• Contributed analysis and map on temp changes and heat stress for wheat nursery sites for 2050s (Cossani and Reynolds, 2012. Physiological Traits for Improving Heat Tolerance in Wheat . Plant Physiol. Vol. 160, 2012).<br>• Presented the preliminary result of wheat physiology and suitability research: Chung, U, S Gbegbelegbe, R Robertson, M Reynolds, J Ortiz-Monasterio, K Sonder, and B Shirefaw. 2012. Evaluating the Site-Specific Potential for Spring Wheat Production in Mexico Under the Uncertainty of Future Climate. ASA-CSSA-SSSA International Annual Meeting, Cincinnati, OH, October 21-24, 2012.<br>• Presented overview of CIMMYT wheat physiology research on heat and drought to AgMIP North American Regional Workshop, September 4-7, 2012, Ames, IA.<br>• Collated weather and experimental field data for the International Heat Stress Genotype Experiment (IHSGE)<br>• Presented summary of IHSGE dataset at AgMIP-Wheat Global Workshop, October 9-12, 2012, Rome, Italy<br>• Organized deployment of prototype high-throughput phenotyping sensor system for 2012-2013 modeling experiments at Obregon in collaboration with the CSIRO High Resolution Plant Phenomics Centre<br>• Compiled Linux binary for the latest version of APSIM model system for installation on new High Performance Computing cluster at CIMMYT-HQ.<br>• Established collaboration network with APSIM model development team in preparation for future wheat model evaluation and improvement. | | |

| **Deliverables status** *(You may add any unexpected deliverable)* | **Type** | **Description** | **Year** | **Status** | **Format** |
|---|---|---|---|---|---|
| | Model tools and software | Conceptual models of climate ready wheat ideotypes developed and analogue sites in climate vulnerable regions identified. | 2012 | Partially completed | Other |

| **Current Partners** | | **Acronym** | **Name** |
|---|---|---|---|
| | ARI - Advanced Research Institution | CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | Scott Chapman | Scott.Chapman@csiro.au |
| | | **Acronym** | **Name** |
| | AI - Academic Institution | | Queensland University |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | Graem Hammer | g.hammer@uq.edu.au |
| | | **Acronym** | **Name** |
| | AI - Academic Institution | | University of Florida |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | Senthold Asseng | sasseng@ufl.edu |
| | | **Acronym** | **Name** |
| | RO - Regional Organization | | Borlaug Institute for South Asia |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | Dr Etienne Duvellier | E.Duvellier@cgiar.org |
| | | **Acronym** | **Name** |
| | NARES - National agricultural research and extension services | | Indian National Wheat Program |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | | |

## Activity No. 16

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|---|---|
| **Activity title** | Development of abiotic (heat and combined drought and heat stress) and biotic screening sites in partnership with NARS to evaluate the resilience of key maize germplasm to future climates |

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| **CCAFS Objective** *(select from drop list)* | | 1.1 Adapted farming systems | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 1.1.3 2014 (1) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Identify suitable sites for heat, combined heat and drought stress and biotic stress based on GIS and local knowledge (location of research stations, access to irrigation and land uniformity). | | |
| | **Objective 2** | Establish site including the characterisation of soil variability, development of basic infrastructure and capacity building. | | |
| **Activity status** | | Partially completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • Screening sites have been established at seven different locations in the Indo-Gangetic Plain (India, Bangladesh, Nepal and Pakistan) together with the establishment of a phenotyping site for combined drought and heat stress screening in Melka Wera, Ethiopia.<br>• For capacity building in IGP an advanced training course on 'Precision phenotyping for abiotic stress tolerance in maize', including heat, drought and water-logging stress was held in India (29 Aug – 1 Sep 2012). The course was attended by 31 scientists, including maize breeders, agronomists, and physiologists from both national programs and seed companies in Bangladesh, India, Philippines, Vietnam, Thailand, Nepal, Indonesia, and Sri Lanka.<br>• Weather stations were installed in 22 key phenotyping locations in East and Southern Africa and a field-based training course on the use and maintenance of weather stations was held during 26-27 Nov 2012 in Ethiopia. The course was attended by over 20 participants from national programs in Ethiopia and Zimbabwe. | | |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Other | Key phenotyping sites for maize established in EA and IGP, including a semi-controlled managed heat stress screening facility/FATE at a suitable location in IGP; national/regional staff trained. | 2012 | Completed | Other |
| Reports, publications | Capacity for controlled, precision screening of heat, combined heat and drought and biotic stresses established at key sites. Physical capacity for screening will be installed at each site and training given to local staff on phenotyping (ca. 15 staff/location for 1 week) | 2012 | Partially completed | Other |
| Select a data type | Publication 'Identification of drought, heat and combined drought and heat tolerance donors in maize (zea mays L.)'. Crop Science (accepted Nov. 2012) | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| RO - Regional Organization | BISA | Borlaug Institute for South Asia | Dr Etienne Duveiller | e.duveiller@cgiar.org |
| NARES - National agricultural research and extension services | EIAR | Ethiopian Institute of Agricultural Research | Me Berhanu Tadesse | btadde@yahoo.com |
| NARES - National agricultural research and extension services | YAAS | Yunnan Academy of Agricultural Science | Professor Fan Xingming | xingmingfan@163.com |

# 2012 Technical Report per Activity

Each Program Participant must provide a small remark against each activity/deliverable to indicate the status of the activity (2-4 sentences required per activity) using the form below. Updated data from the current partners is also required.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

### Activity No. 24

| | | |
|---|---|---|
| **Activity title** | | Identify and evaluate differential role and impact of risk management strategies in maize-legume systems on women and men using farm household bioeconomic models |
| **CCAFS Objective** *(select from drop list)* | 2.2 Identify and test tools and strategies to use advance information to better manage climate risk through food delivery, trade and crisis response | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 2.1.1 2012 |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Analyse survey data to identify and document formal and informal risk management strageties employed by the rural poor in EA. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | **• As part of the process of developing the bio-economic framework for the model, different cropping systems for maize and beans have been added to the bio-economic model developed for Kothapally, India.<br>• The farm-level impact of CAhas been modelled for one site to provide estimates for yield response and carry-over functions.<br>• In order to complete the model input data for typical households at the selected site in Ethiopia are now needed because as of now, the model is using data from Kothapally and 'dummy' data for the different cropping systems for maize and beans in Ethiopia.<br>• Climate variability data also needs to be added together with key practices from conservation agriculture to the model developed in GAMS.** |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Model tools and software | Bio-economic model to assess the potential of CA at enhancing food security under increased climate variability for typical farm households in Ethiopia | 2012 | Partially completed | Other |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| Donors - Donors | SIMLESA | Southern Africa | Dr M Mekuria | M.Mekuria@cgiar.org |
| NARES - National agricultural research and extension services | | Ethiopian Institute of Agricultural Research | Mekonnen Sime | mekonnensm@yahoo.com |
| AI - Academic Institution | | University of Queensland | Yohannis Mulu | yohannism@gmail.com |

### Activity No. 25

| | | |
|---|---|---|
| **Activity title** | | Participatory experimentation with risk management strategies in maize-legume-based systems in EA. |
| **CCAFS Objective** *(select from drop list)* | 2.1 Identify and test innovations that enable rural communities to better manage climate-related risk and build more resilient livelihoods | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 2.1.3 2012 (2) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Document regional production-system specific risk management strategies. |
| | **Objective 2** | Establish particpatory research trials involving risk management practices for local adaptation. |
| | **Objective 3** | Create awareness of risk management strategies among the local change agents. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | **• Exploratory trials conducted at the farm level in Ethiopia, Kenya and Tanzania within SIMLESA activities. Also, trials, within EC-IFAD activities, on residue management and comparison of tillage systems (ridges vs flat beds) have been set up for to investigate the effect of CA practices on water use efficiency<br>• Various trials on CA, crop management, weed management, crop rotations, intercropping established are on-going in three countries.<br>• Partially completed activities will be continued in 2013 with newly recruited staff (two social scientists to complement the agronomic work). The workshop on risk management strategies will be organized in the first half of 2013 with the support of the newly recruited innovations scientist. Agronomic data collected on current on-farm exploratory trials. This process is on-going and will be repeated every season. Due to delays in hiring new staff curation of past data has only just begun.** |

**Deliverables status**
*(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Model tools and software | Conceptual framework developed for farmer-participatory studies on risk management strategies in rice-wheat systems in the IGP - crop and farm level. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Capacity | Participatory strategic research on trials on residue, water and nutrient management in CA systems. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Workshops | Workshop on risk management strategies. | 2012 | Partially completed | Other |
| Data | Establish trials on CA in rainfed areas for reducing risks through resilient technologies. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| NARES - National agricultural research and extension services | EIAR | Ethiopian Institute of Agricultural Research | Mekonnen Sime | mekonnesm@yahoo.com |
| NARES - National agricultural research and extension services | KARI | Kenya Agricultural Research Institute | Charles Nkonge | CNkonge@kari.org |
| NARES - National agricultural research and extension services | DRD | Department of Research and Development | Lucas Mugendi | lmugendi@yahoo.com |
| RO - Regional Organization | ASARECA | Association for Strengthening Agricultural Research in Eastern and Central Africa | Lydia Kimenye | L.kimenya@asareca.org |
| ARI - Advanced Research Institution | ARC | Africa Research Council | Yolisa Pakela-Jezille | PakelaY@arc.agric.za |
| ARI - Advanced Research Institution | QAAFI | Queensland Alliance for Agriculture and Food Innovation | Daniel Rodriguez | d.rodriguez@uq.edu.au |
| CG - CGIAR Center | SIMLESA | Southern Africa | Mulugetta Mekuria | M.Mekuria@cgiar.org |

## Activity No. 26

| | | |
|---|---|---|
| **Activity title** | Participatory experimentation with risk management strategies in rice-wheat-based systems in the IGP. | |
| **CCAFS Objective** *(select from drop list)* | 2.1 Identify and test innovations that enable rural communities to better manage climate-related risk and build more resilient livelihoods | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 2.1.3 2012 (2) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Document regional production-system specific risk management strategies. |
| | **Objective 2** | Establish particpatory research trials involving risk management practices for local adaptation. |
| | **Objective 3** | Create awareness of risk management strategies among the local change agents. |
| **Activity status** | Partially completed | |

**Insert a small remark to indicate the status of the activity.**
*(2-4 sentences required per activity)*

- **Participatory action research is being conducted with farmers' groups and cooperatives where farmers collectively learn about various risks of changing climate and design appropriate coping strategies in their cropping system.**
- **Various trails to demonstrate prevalent risk management options have been established by farmers themselves under the aegis of farmers' group/cooperative in Punjab, Haryana and Bihar.**
- **CCAFS staff participated in farmers meeting and provided technical backstopping when required.**
- **In-field stakeholder meeting on 'Empowering Farmers for Climate Smart Agricultural Practices in Haryana' was organized in Taraori in partnership with Haryana Farmers' Commission (Government of Haryana), Haryana Department of Agriculture, Indian Council of Agricultural Research (ICAR), Directorate of Wheat Research (DWR), Central Soil Salinity Research Institute (CSSRI), HAU and CSISA to aware farmers of the strategies for improving efficiency and resilience of farming systems as a way to ensure sustainable food security (http://ccafs.cgiar.org/blog/how-secure-gains-made-agricultural-production-changing-climate).**
- **A one-day travelling seminar on "Climate Smart Practices" were organized in the CCAFS grid in Vaishali district of Bihar in partnership with RAU, IARI and IFFCO foundation to discuss and raise awareness amongst farmers about the opportunities of climate smart practices in agriculture (at http://ccafs.cgiar.org/blog/Teaching-Indian-farmers-climate-smart-practices-on-the-go).**
- **Two CCAFS participating farmers in Haryana grid were recognized with State Level award by the Chief Minister of the Haryana for their efforts on adaptation and popularization of climate smart technologies.**

**Deliverables status**
*(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Other | Completion of 10 focus group discussions (FGD) with farmers on their experiences and opinions of trying different climate smart technologies. | 2012 | Partially completed | Other |
| Capacity | Training of famers in climate smart technologies. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Workshops | Workshop on risk management strategies. | 2012 | Completed | Blogpost |
| Other | Establish 200 participatory trials on CA in rainfed areas for reducing risks through resilient technologies. | 2012 | Partially completed | Other |
| Data | Collection of agronomic and other related data (e.g. input use, economic profitability, weather) from on-going strategic (5) and participatory (200) risk management trials. | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| NARES - National agricultural research and extension services | ICAR | Indian Council of Agricultural Research | Dr S Ayyappan | dg.icar@nic.in |
| NARES - National agricultural research and extension services | | CCS Haryana Agricultural University | Dr KS Khokhar | vchauhisar@gmail.com |
| ARI - Advanced Research Institution | IPNI | International Plan Nutrition Institute | Dr Kaushik Majumdar | kmajumdar@ipni.net |
| CG - CGIAR Center | | Cereal Systems Initiative for South Asia | Dr Etienne Duveiller | E.Duveiller@cgiar.org |
| NARES - National agricultural research and extension services | | Punjab Agricultural Research Council | Dr BS Dhillon | vc@pau.edu |
| NARES - National agricultural research and extension services | | Bangladesh Agricultural Research Council | Dr Wais Kabir | waiskabir@hotmail.com |
| ARI - Advanced Research Institution | | International Development Enterprise | | |

## Activity No. 27

| | | |
|---|---|---|
| **Activity title** | | Analysis of survey data and to identify and document formal and informal risk management strategies employed by the rural poor in the IGP |
| **CCAFS Objective** *(select from drop list)* | | 2.1 Identify and test innovations that enable rural communities to better manage climate-related risk and build more resilient livelihoods |
| **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | | 2.1.3 2012 (3) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | To identify the existing information networks, information needs and constraints of farming households to access information in IGP. |
| | **Objective 2** | To analyze the factors that influence the selection of information sources by farming households |
| | **Objective 3** | To identify the extent of use of mobile phones, the benefits to farmers for agricultural activities and farmers perception on further use of mobile phones to manage production and marketing risks. |
| **Activity status** | | Completed |

**Insert a small remark to indicate the status of the activity.**
*(2-4 sentences required per activity)*

- **Completed and analysed household survey in IGP on farmers' access to agricultural information sources.**
- **Data showed that farmers had access to multiple sources of information; more than 90% were obtaining information from other farmers in their own or neighbouring villages and 99% had access to mobile phones.**
- **Farmers placed greatest priority not on market information but on inputs and pre-sowing information that was required to manage production risks.**
- **Lack of extension facilities and access to inputs posed the major constraints to effective utilisation of information.**
- **Socio-economic factors (e.g. age, level of education, farm size) had a significant influence on the sources of agricultural information used by farmers.**
- **Conventionally, farmers prefer to get information through face-to-face interaction rather than any other source. The impact of mobiles as a mode of providing information for farming will depend on the ability of mobile networks to link farmers to information in a timely and accurate manner.**
- **The study confirmed that mobile phones cannot replace face-to-face interactions but they can play an important role in bridging information gaps.**

**Deliverables status**
*(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Data collected through a primary survey of 1200 farming households in five Indo-gangetic plain (IGP) states of India. | 2012 | Completed | Database (*.sql, *.mdb, etc) |
| Reports, publications | Agricultural Information Networks and Farmers Risk Management Strategies- A Survey of Indo Gangetic Plains in India- CIMMYT SEP working paper | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Reports, publications | Publication: Surabhi Mittal and Mamta Mehar (2012): How Mobile Phones Contribute to | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |

## Activity No. 28

| | | |
|---|---|---|
| **Activity title** | | Evaluate ICT-based and institutional information delivery models for effective and equitable approaches for managing climate-induced production and market risks. |
| **CCAFS Objective** *(select from drop list)* | | 2.1 Identify and test innovations that enable rural communities to better manage climate-related risk and build more resilient livelihoods |
| **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | | 2.1.3 2012 (3) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Analyze the scope and potential of the use of ICT, and especially mobile phones, for farmers and the agricultural sector. |
| | **Objective 2** | Identify farmers' present sources of information and information networks and identify the information needs that help them to mitigate production and market risk. |
| | **Objective 3** | Identify existing ICT-based innovations in the agricultural sector, the key players and the institutional arrangements for the dissemination of information, by studying selected models and innovations in the form of case studies. |
| | **Objective 4** | Identify the constraints and challenges, and suggest key questions that should be taken up for research based on this scoping study. |
| **Activity status** | | Completed |

**Insert a small remark to indicate the status of the activity.**
*(2-4 sentences required per activity)*

- **Completed an analysis of the role of mobile phones in reducing information search costs and asymmetries, and increasing market efficiencies. The results indicated that:**
  - **Mobile phones were found to encourage greater market participation and diversification towards high-value crops amongst poor farmers. Such changes have helped increase farm earnings through higher price realization and reduced wastage.**
  - **Realising the full potential benefits of mobile phones is constrained by a set of factors that prevent farmers from leveraging fully the information they receive. The barriers apply more to the small farmers than their richer counterparts, and include shortcomings in physical infrastructure affecting access to markets, storage and irrigation.**
  - **Issues regarding the availability of critical products and services including seeds, fertilisers, medicines and credit also exist for the farmers.**
  - **As mobile penetration continues to increase amongst farming communities and information services continue to adapt and proliferate, the scope for much greater impact on rural productivity may be realised in the near future**

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Reports, publications | Analysis and identification of innovative ICT-based information delivery and risk management strategies for rural communities - CIMMYT- Socio economics working paper no. 3 | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |

| Deliverables status *(You may add any unexpected deliverable)* | Type | Description | Year | Status | Format |
|---|---|---|---|---|---|
| | Reports, publications | An assessment of farmer's information networks in India - Role of Modern ICT in managing risk - Paper presented (oral full length presentation) at 8th international conference of AFITA (Asian Federation for Information Technology in Agriculture), on 4th September 2012 (Mamta Mehar and Surabhi Mittal). | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| | Reports, publications | Climate services in context: Is Information Enough? – Surabhi Mittal. Plenary Presentation during the South-South Learning Workshop on "Scaling up Climate Services for Farmers in Africa and South Asia" , held in Senegal, December 10-12, 2012. | 2012 | Completed | Presentation (*.ppt, *.odp) |

| Current Partners | | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|---|
| | NGO_DO - Non-governmental organization/Development organization | KSL | Kissan Sanchar Limited | Kamal Jeet | kamal@sgk.in |
| | Select a partner type. | IKSL | IFFCO Kisan Sanchar Limited | Ganesh Shrotriya | shrotriyagc@yahoo.com |
| | Select a partner type. | RML | Reuters Market Light | Amit Mehra | Amit.Mehra@thomsonreuters.com |

## Activity No. 29

| | | |
|---|---|---|
| **Activity title** | | Evaluation of historic maize data and analysis of GIS data to identify climate analogues and support farmers' risk management strategies under climate variability. |
| **CCAFS Objective** *(select from drop list)* | 2.3 Support risk management through enhanced prediction of climate impacts on agriculture, and enhanced climate information and services | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 2.3.1 2012 |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Climate projections at the maize mega-environment level developed for EA. |
| | **Objective 2** | Identification of future maize mega-environments. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | **• In 2012 Climate projections for both temperature and rainfall at the maize mega-environment level were developed for ESA using the outputs of 19 global climate models (and submitted to Food Security).**<br>**• Changes in rainfall patterns were highly variable, in many areas the total rainfall did not change, however the distribution of rainfall was altered.**<br>**• By 2050, air temperatures are expected to increase throughout maize mega-environments within sub-Saharan Africa by an average of 2.1 °C.** |

| Deliverables status *(You may add any unexpected deliverable)* | Type | Description | Year | Status | Format |
|---|---|---|---|---|---|
| | Reports, publications | Publication 'Adapting maize production to climate change in sub-Saharan Africa. Food Security (submitted October 2012 and accepted with major revisions). | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |

| Current Partners | | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|---|
| | NARES - National agricultural research and extension services | KARI | Kenya Agricultural Research Institute | Dr Dickson Ligeyo | ligeyootieno@yahoo.co.uk |
| | NARES - National agricultural research and extension services | EIAR | Ethiopian Institute of Agricultural Research | Mr Berhanu Tadesse | btadde@yahoo.com |
| | Donors - Donors | BMGF | Bill & Melinda Gates Foundation | Dr Gary Atlin | gary.atlin@gatesfoundation.org |

## Activity No. 30

| | | |
|---|---|---|
| **Activity title** | | Evaluation of historic maize data and analysis of GIS data to identify climate analogues and support farmers' risk management strategies under climate variability. |
| **CCAFS Objective** *(select from drop list)* | 2.3 Support risk management through enhanced prediction of climate impacts on agriculture, and enhanced climate information and services | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 2.3.1 2012 |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Integrate data from diverse sources to help develop crop adaptation strategies for the most climate vulnerable groups/regions. |
| | **Objective 2** | Analyze costs and benefits of adopting different combinations of crop technologies. |
| | **Objective 3** | Develop and disseminate adaptive crop technology packages targetted to specific regional needs. |
| **Activity status** | | Partially completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | **• Produced maps of wheat yield sensitivity to warming in Sudan and India, with identification of hotspots, including comparison of results between statistical and process-based models (Universities Stanford and Florida).**<br>**• Produced maps of estimated yield impacts for all irrigated wheat areas in the world, based on climate projections for the next 2 decades.**<br>**• Identified locations that are analogues for future climate at hotspots identified in second bullet point above.** |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Data base encompassing relevant IWIS data, crop and climate model outputs for heat stressed regions, socioeconomic data to help with prioritization, and yield gap analysis. | 2013 | Partially completed | Other |
| Reports, publications | Cost benefit analysis of technology packages for different regions | 2014 | Uncompleted | Select a format |
| Workshops | Information packets of farmer risk management strategies | 2014 | Uncompleted | Select a format |
| Other | Stress adapted germplasm deployed as targetted nurseries | 2015 | Uncompleted | Select a format |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| AI - Academic Institution | | Stanford University | David Lobell | dlobell@stanford.edu |
| AI - Academic Institution | | University of Florida | Dr Senthold Asseng | sasseng@ufl.edu |

# 2012 Technical Report per Activity

Each Program Participant must provide a small remark against each activity/deliverable to indicate the status of the activity (2-4 sentences required per activity) using the form below. Updated data from the current partners is also required.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

### Activity No. 35

| | | | | |
|---|---|---|---|---|
| **Activity title** | Analysis of the economic incentives and benefits to farmers from adoption of conservation agriculture for adaptation to and mitigating climate change | | | |
| **CCAFS Objective** *(select from drop list)* | 3.2 Identify institutional arrangements and incentives that enable smallholder farmers and common-pool resource users to reduce GHGs and improve livelihoods | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 3.2.1 2012 (1) | |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Assess the economic incentives and benefits to farmers of adopting CA rather than traditional agricultural practices. | | |
| | **Objective 2** | Analyse the constraints to adopting CA by farm households, especially the poor subsistence farmers. | | |
| **Activity status** | Partially completed | | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Completed an assessment of the determinants of the adoption of conservation agriculture (CA) by farmers in the Indo-Gangetic Plains (IGP) using primary data collected from 972 farm households in Nepal, India and Bangladesh under the CSISA project. The results are being written up for publication.<br>• Completed an analysis of the economic and environmental benefits of no-till wheat examined using farm trial data from the north-west region of India. The results are being written up for publication.<br>• An assessment of the factors determining women's level of participation in decision making in terms of land sales and leases. The results are being written up for publication<br>• A sub-grant contract with Creative Agri Solutions Pvt. Ltd., a survey and research agency based at New Delhi, India was completed. The survey will evaluate the socio-economics of climate adaptation at CCAFS benchmark sites in India, Nepal and Bangladesh. The sample size is for 2500 households. The questionnaire was designed with the help of several other partners from IFPRI-India and IWMI-India. The questionnaire was pre-tested once in Karnal, India and we are in a process of pre-testing it in Bihar, India. | | | |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Reports, publications | Determinants of Conservation Agriculture in the Indo-Gangetic Plains (To be submitted to "Agricultural Economics". The paper uses data collected from Nepal, India and Bangladesh under CSISA project) | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Reports, publications | Economic and Environmental Benefit of no-till Wheat: A case of North-West India (This paper uses field trials data collected from farmers' field in Haryana, India for three consecutive years i.e., 2009/10, 2010/11, and 2011/2012. The first draft is ready.) | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Reports, publications | Do Women in South Asia have Control over Farm Land Decisions? ( This paper uses data from CSISA project. The paper is ready to submit to the journal.) | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Other | Finalize the contract with "Creative Agri Solutions Pvt. Ltd." for carrying out the research project entitled "Socio-economic and climate adaptation survey of CCAFS benchmark sites in India, Nepal and Bangladesh" The sample size for this study is 2500 households. | 2012 | Completed | Other |

**Current Partners**

| Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|
| CRP - Challenge Research Program | Cereal Systems Initiative for South Asia | Dr Etienne Duveiller | E.Duveiller@cgiar.org |

### Activity No. 36

| | | | |
|---|---|---|---|
| **Activity title** | Identify promising incentives, institutions and market-based mechanisms and policies for adoption of conservation agriculture by smallholder farmers in EA | | |
| **CCAFS Objective** *(select from drop list)* | 3.2 Identify institutional arrangements and incentives that enable smallholder farmers and common-pool resource users to reduce GHGs and improve livelihoods | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 3.2.1 2012 (1) |

| | | |
|---|---|---|
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | To identify policies, institutions, social capital and network, governance and market factors that accelerate or hinder adoption of conservation agriculture by smallholder farmers in EA. |
| | **Objective 2** | Evaluate the economics and environmental impacts of adoption of alternative combinations of integrated improved agricultural practices. |
| **Activity status** | | Completed |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • The adoption and impacts of different sustainable agricultural practices (SAPs; legume-maize rotations, reduced/zero tillage) on income, labor use and the environment were analysed for rural Ethiopia using a 900 sample household dataset. The analysis indicates that:<br>o Strong cross-technologies interdependences exist and the highest payoff is achieved when SAPs are adopted in combination suggesting that policy makers should promote packages of agricultural technologies;<br>o To improve the adoption of multiple SAPs, policy makers and development practitioners should seek to strengthen local institutions and technically capable extension service providers, maintain or increase household asset bases, and establish and strengthen social protection schemes (public safety-net programs);<br>o As important is the provision of better rainfall forecasts, not only in terms of amount but also in terms of timing and distribution;<br>o Strategies for improving productivity and minimizing the use of non-renewable inputs should combine improved seeds with appropriate SAPs;<br>o Education of women may be one of the most important driving forces of sustainable agriculture in Africa. |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Reports, publications | Paper on adoption of conservation agriculture and institutional arrangements and policies that condition farmers' investments in maize-legume systems in EA (relevant to African conditions). | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Reports, publications | Analytical framework, methods and estimated economic incentive from adoption of integrated practices (CA, SLM, DTM) in EA. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |
| Select a data type | Cross-section plot level data. | 2012 | Completed | Database (*.sql, *.mdb, etc) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| ARI - Advanced Research Institution | EIAR | Ethiopian Institute of Agricultural Research | Mekonnen Sime | mekonnensm@yahoo.com |
| ARI - Advanced Research Institution | SAEI | Selian Agricultural Research Institute | Frank Mmbando | frank_fem@yahoo.com |
| CG - CGIAR Center | SIMLESA | Southern Africa | Mulugetta Mekuria | m.mekuria@cgiar.org |

## Activity No. 37

| | | |
|---|---|---|
| **Activity title** | | Design and implementation of protocols to assess C sequestration under different management practices at field and landscape scale and identification of data gaps in the various systems of the two regions and acquisition of field equipment. Collection of primary and secondary data on soil carbon dynamics under a range of management practices. |
| **CCAFS Objective** *(select from drop list)* | | 3.3 Test and identify desirable on-farm practices and their landscape-level implications |
| **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | | 3.3.2 2012 |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Collect primary and secondary data on C sequestration. |
| | **Objective 2** | Identify appropriate C sequestration methodology, data and analytical tools. |
| **Activity status** | | Partially completed |

**Insert a small remark to indicate the status of the activity.**
*(2-4 sentences required per activity)*

**Global/Mexico**

• Participation on the workshop "Towards a protocol for evaluating mitigation options for smallholders at whole-farm and landscape scales", Garmisch, Germany, 8 – 10 October 2012

• On-going development of a framework for scenario assessment of mitigation and adaptation to climatic change (Lopez-Ridaura S. and Gerard B. 2012. Adaptation to climate change for cereal based small scale farming systems. Options at different levels, from plant to region. Third International AGRONOMY CONGRESS. Agriculture Diversification, Climate Change Management and Livelihoods. Indian Society of Agronomy, New Delhi And, Indian Council of Agricultural Research. November 26-30, 2012, New Delhi, India).

• TOR developed and agreed for collaboration with Rothamsted Research on meta-analysis of C/N responses in wheat and maize based systems under different management practices in IGP and SSA.

• The effect of tillage practice, residue management and crop rotation on C sequestration in Central Mexico was reported in 2 peer reviewed journal publications (Dendooven, L., Gutiérrez-Oliva, V.F., Patiño-Zúñiga, L., Ramírez-Villanueva, D.A., Verhulst N., Luna-Guido M., Marsch, R., Montes-Molina, J., Gutiérrez-Miceli, F.A., Vásquez-Murrieta, S., Govaerts, B., 2012. Greenhouse gas emissions under conservation agriculture compared to traditional cultivation of maize in the central highlands of Mexico. Science of the Total Environment 431: 237–244; Dendooven, L., Patiño-Zúñiga, L., Verhulst N., Luna-Guido M., Marsch, R., Govaerts, B., 2012. Global warming potential of agricultural systems with contrasting tillage and residue management in the central highlands of Mexico. Agriculture, Ecosystems and Environment 152: 50-58) and one book chapter (Dendooven, L., Patiño-Zúñiga, L., Verhulst, N., Boden, K., García-Gaytán, A., Luna-Guido, M., Govaerts, B., 2012. Greenhouse Gas Emissions from No-tilled Permanent Raised and Conventional Tilled Beds in the Central Highlands of Mexico. In: Kang, M.S. (Ed.), Preparing Agriculture for Climate Change, In press) as part of the assessment of global warming potential of different management practices.

• Didactic material on conservation agriculture and C sequestration was developed and published by CIMMYT (Verhulst, N., François, I.M., Govaerts, B., 2012. Conservation agriculture and carbon sequestration: Between myth and farmer reality. Mexico, D.F., CIMMYT).

**Deliverables status**
*(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | C-sequestration potentials of different management practices in different cropping systems, soil types and ecologies. | 2012 | Partially completed | Database (*.sql, *.mdb, etc) |
| Capacity | Training provided to staff in measurement of C sequestration in Haryana. | 2012 | Partially completed | Other |
| Workshops | Data needs and analytical tools for quantyifying GHG emissions | 2012 | Completed | Other |
| Reports, publications | Four papers produced in peer-reviewed journals. Four other papers were presented at the 3rd International Agronomy Congress, India. | 2012 | Completed | Document (*.doc, *.odt, *.pdf) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| NARES - National agricultural research and extension services | ICAR | Indian Council of Agricultural Research | Dr S Ayyappan | dg.icar@nic.in |
| NARES - National agricultural research and extension services | CCSHAU | CCS Haryana Agricultyural University | Dr KS Khokhar | vchaihisar@gmail.com |
| ARI - Advanced Research Institution | IPNI | International Plant Nutrition Institute | Dr Kaushik Majumdar | kmajumdar@ipni.net |
| NARES - National agricultural research and extension services | BISA | Bangladesh Agricultural Research Council | Dr Wais Kabir | waiskabir@hotmail.com |
| NARES - National agricultural research and extension services | PAU | Punjab Agricultural Research Council | Dr BS Dhillon | vc@pau.edu |
| CG - CGIAR Center | CSISA | Cereal Systems Initiative for South Asia | Dr Etienne Duveller | E.Duveiller@cgiar.org |

## Activity No. 38

| | | |
|---|---|---|
| **Activity title** | | Review of state of the art in assessing GHG (N volatilization and CO2) and development of protocols + acquisition of field and lab equipment. Implementation of regional trials to estimate GHG under a range of management practices in IGP irrigated agroecologies |
| **CCAFS Objective** *(select from drop list)* | 3.3 Test and identify desirable on-farm practices and their landscape-level implications | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* 3.3.2 2012 |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Review of GHG analysis protocols. |
| | **Objective 2** | Establish GHG emission measurements facilities at field and lab. |
| | **Objective 3** | Establish on-farm trials on constrasting management practices in rice-wheat systems for measurement of GHGs. |
| | **Objective 4** | Capacity building of students in measurement of GHG emissions. |
| **Activity status** | | Partially completed |

**Insert a small remark to indicate the status of the activity.**
*(2-4 sentences required per activity)*

**Mexico/Global:**

• The effect of tillage practice, residue management and crop rotation on GHG emissions in Central Mexico was reported in 2 peer reviewed journal publications (Dendooven, L., Gutiérrez-Oliva, V.F., Patiño-Zúñiga, L., Ramírez-Villanueva, D.A., Verhulst N., Luna-Guido M., Marsch, R., Montes-Molina, J., Gutiérrez-Miceli, F.A., Vásquez-Murrieta, S., Govaerts, B., 2012. Greenhouse gas emissions under conservation agriculture compared to traditional cultivation of maize in the central highlands of Mexico. Science of the Total Environment 431: 237–244; Dendooven, L., Patiño-Zúñiga, L., Verhulst N., Luna-Guido M., Marsch, R., Govaerts, B., 2012. Global warming potential of agricultural systems with contrasting tillage and residue management in the central highlands of Mexico. Agriculture, Ecosystems and Environment 152: 50-58) and one book chapter (Dendooven, L., Patiño-Zúñiga, L., Verhulst, N., Boden, K., García-Gaytán, A., Luna-Guido, M., Govaerts, B., 2012. Greenhouse Gas Emissions from No-tilled Permanent Raised and Conventional Tilled Beds in the Central Highlands of Mexico. In: Kang, M.S. (Ed.), Preparing Agriculture for Climate Change, In press), as part of the assessment of global warming potential of different management practices.

• The evaluation of the effect of tillage practice and residue management on GHG emissions in irrigated wheat-based systems was initiated, with national partners CINVESTAV and ITSON. Two MSc students were trained in the collection and analysis of GHG emission data.

• A book chapter summarizing results from long-term experiments in Mexico related to climate change adaptation and mitigation was published (Verhulst, N., Govaerts, B., Sayre, K.D., Sonder, K., Romero-Perezgrovas, R., Mezzalama, M., Dendooven, L., 2012. Conservation agriculture as a means to mitigate and adapt to climate change, a case study from Mexico. In: Wollenberg, E., Nihart, A., Tapio-Biström, M.-L., Grieg-Gran, M. (Eds.), Climate Change Mitigation and Agriculture. Earthscan, Oxon, ISBN: 9781849713924, pp. 287-300).

**Deliverables status**
*(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Other | GHG measurements established in crop trials. | 2012 | Partially completed | Other |
| Reports, publications | Review paper on "Conservation agriculture for climate change mitigation and adaptation". Advances in Agronomy. First draft completed and final submission end of Feb 2013. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |
| Capacity | Training of PhD students in measurements of GHG emuissions. | 2012 | Partially completed | Other |
| Workshops | Participation in GHG measuremet protocol workshop, Germany. | 2012 | Completed | Other |
| Other | Protocol for GHG measurements developed in the form of a manual. | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| AI - Academic Institution | CCSHAU | CCS Haryana Agricultural University | Dr KS Khokhar | vchauhisar@gmail.com |
| NARES - National agricultural research and extension services | ICAR | Indian Council of Agricultural Research | Dr S Ayyappan | dg.icar@nic.in |
| ARI - Advanced Research Institution | | International Plant Nutrition Institute | Dr Kaushik Majumdar | kmajumdar@ipni.net |
| CG - CGIAR Center | | Cereal System Initiative for South Asia | Dr E. Duveiller | E.Duveiller@cgiar.org |

| | | | |
|---|---|---|---|
| | | **Acronym** | **Name** |
| | NARES - National agricultural research and extension services | | Punjab Agricultural Research Council |
| | | **Contact Point Full Name** | **Contact Point Email** |
| | | Dr BS Dhillon | vc@pau.edu |

# 2012 Technical Report per Activity

Each Program Participant must provide a small remark against each activity/deliverable to indicate the status of the activity (2-4 sentences required per activity) using the form below. Updated data from the current partners is also required.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

| Activity No. 1 | | | | | |
|---|---|---|---|---|---|
| **Activity title** | Communication of successful strategies, approaches, policies, and investments contributing to improved science-informed CC-ag development-food security policies and decision making in rice-wheat systems and maize-legume systems in view of main- streaming adaptation strategies. | | | | |
| **CCAFS Objective** *(select from drop list)* | 4.1 Explore and jointly apply approaches and methods that enhance knowledge to action linkages with a wide range of partners at local, regional and global levels | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 4.1.2 2012 | | |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | To achieve the deliverables below. | | | |
| **Activity status** | Completed | | | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Substantive components of CIMMYT research and development activities in breeding (drought and heat tolerance, for example) and cropping systems (conservation agriculture) are providing farmers with options to address climate change adaptation and, in several cases, mitigation.<br>• These efforts span more than two decades and are significantly reflected in center messaging and communications.<br>• In 2012, dozens of communications outputs and actions included climate change as a key theme, and many made specific mention of CCAFS (see 'Summary of Output'). CCAFS has picked up and re-run many of the items, which CIMMYT tags for climate change and/or CCAFS, and CIMMYT communicators have been in direct contact with CCAFS counterparts around several of these events or stories. | | | | |
| **Deliverables status** *(You may add any unexpected deliverable)* | **Type** | **Description** | **Year** | **Status** | **Format** |
| | Communication products | Communication outputs (regional scenario story lines, policy briefs) drawing on results from other milestones, directed at communities in EA and the IGP, donors and the general public. | 2012 | Completed | Select a format |

| Activity No. 3 | | | | | |
|---|---|---|---|---|---|
| **Activity title** | Assembling and development of data and parameters to integrate maize and wheat systems information into global models, including calibration of selected benchmark cultivars for target environments. | | | | |
| **CCAFS Objective** *(select from drop list)* | 4.2 Assemble data and tools for analysis and planning | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 4.2.1 2012 (3) | | |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | Build vulnerability maps | | | |
| | **Objective 2** | Build regional scenarios and storylines | | | |
| **Activity status** | Completed | | | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | • Minimum datasets required to run biophysical models for maize and wheat have been collected from selected global experimental stations<br>• Datasets required to simulate climate extreme events (heat wave and drought) established<br>• CERES-Wheat and CERES-Maize models have been calibrated and evaluated with benchmark maize and wheat varieties: analysis done based on global yield trial datasets<br>• Integrated spatial, biophysical and socioeconomic climate change modeling tested at mega environment and global scales and initial results completed<br>• Vulnerability maps that show global and regional changes in yield and production of wheat and maize by 2050s developed.<br>• Two working papers submitted for review:<br>"Promising maize technologies under a changing climate"<br>"Promising wheat technologies and climate change"<br>• Paper drafted on "Promising Wheat Technologies: a bio-economic modeling approach"<br>• Conference presentation: Chung, U, S Gbegbelegbe, R Robertson, M Reynolds, J Ortiz-Monasterio, K Sonder, and B Shirefaw. 2012. Evaluating the Site-Specific Potential for Spring Wheat Production in Mexico Under the Uncertainty of Future Climate. ASA-CSSA-SSSA International Annual Meeting, Cincinnati, OH, October 21-24, 2012. | | | | |
| **Deliverables status** *(You may add any unexpected deliverable)* | **Type** | **Description** | **Year** | **Status** | **Format** |
| | Model tools and software | Vulnerability maps | 2012 | Completed | GIS raster (ESRI Grids, GeoTiff, etc) |
| | Model tools and software | Parameterisation of models | 2012 | Partially completed | Other |
| **Current Partners** | **Acronym** | **Name** | | | |
| CG - CGIAR Center | IFPRI | International Food Policy Research Institute | | | |
| | **Contact Point Full Name** | **Contact Point Email** | | | |
| | Ricky Robertson, Siwa Msangi, Jawoo Koo | j.koo@cgiar.org | | | |

## Activity No. 4

| | | | | |
|---|---|---|---|---|
| **Activity title** | | Integrated assessments for estimating future impacts and identifying policy options for adaptation to and mitigation of climate change. | | |
| **CCAFS Objective** *(select from drop list)* | | 4.3 Refine frameworks for policy analysis | **CCAFS Milestone No.** *(select from drop list / for further details go to CCAFS 2012 - 2015 LOGFRAME sheet)* | 4.2.1 2012 (3) |
| **Activity objectives** *(what the activity aims to achieve)* | **Objective 1** | To build a climate, weather, crop and crop management database for maize production systems. | | |
| | **Objective 2** | To calibrate and evaluate these crop models. | | |
| | **Objective 3** | To use these crop models to assess the impact of current and future climate on maize production at the regional and global levels and develop policy options. | | |
| **Activity status** | | Completed | | |
| **Insert a small remark to indicate the status of the activity.** *(2-4 sentences required per activity)* | | • Datasets necessary to run the DSSAT model (long-term daily climate data, soil profile information, crop and crop management data) collected from selected experimental stations in EA and database for crop modeling established: maize<br>• Three researchers trained in high performance cluster modeling<br>• The DSSAT maize model was calibrated using six benchmark maize varieties that are widely grown in the six maize mega environments using historical maize yield trial data from Africa<br>• The impact of climate change on maize yield and production in 2050 was determined at global scale and for the African continent. Climate change hotspot countries, regions and maize mega environments identified for future maize production. A journal article on "Maize futures under a changing climate in Africa" prepared.<br>• The effect of climate change on maize production by 2050 and its economic impact on African countries initiated using an integrated approach of spatial, biophysical and economic (IMPACT) modeling<br>• Results on the impact of climate change on maize yield and production presented to the Drought Tolerance Maize for Africa (DTMA) annual meeting; "Modeling the future of maize under a changing climate in Africa: Initial results from bio- economic and spatial modeling", 24-28 September 2012, Nairobi, Kenya<br>• Study on biophysical impact of extreme weather events on maize production in the USA and related effects on regional and global food production, trade and security conducted: bio-economic framework developed and preliminary results generated.<br>• Study on the impact of climate change on cereal-based cropping systems in south Asia initiated: bio-economic framework developed and preliminary results available. | | |

**Deliverables status** *(You may add any unexpected deliverable)*

| Type | Description | Year | Status | Format |
|---|---|---|---|---|
| Data | Data and parameters for DSSAT model calibration for global and regional assessments of climate change on maize production | 2012 | Completed | Database (*.sql, *.mdb, etc) |
| Capacity | Training in high performance cluster modeling | 2012 | Completed | Other |
| Model tools and software | DSSAT Maize model calibrated and evaluated | 2012 | Completed | Other |
| Reports, publications | Reports on the regional and global impact of climate change on maize productiona and productivity | 2012 | Partially completed | Document (*.doc, *.odt, *.pdf) |

**Current Partners**

| | Acronym | Name | Contact Point Full Name | Contact Point Email |
|---|---|---|---|---|
| AI - Academic Institution | | University of Florida | Senthold Asseng | sasseng@ufl.edu |
| CG - CGIAR Center | IFPRI | International Food Policy Research Institute | Ricky Robertson, Siwa Msangi, Jawoo Koo | r.robertson@cgiar.org; s.msangi@cgiar.org; j.koo@cgiar.org |

# 2012 summary report of activities and deliverables by Output level

Each Program Participant must prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives. Length is dependent on budget size so please refer to the table on the explanatory notes.

## CCAFS Center Led Activities

## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

| | |
|---|---|
| **Theme 1. Adaptation to Progressive Climate Change** | |
| **Objective 1.1 Analyze and design processes to support adaptation of farming systems in the face of future uncertainties of climate in space and time** | |
| **Outcome 1.1: Agricultural and food security strategies that are adapted towards predicted conditions of climate change promoted and communicated by the key development and funding agencies (national and international), civil society organizations and private sector in at least 20 countries** | |
| **Output 1.1.1** Development of farming systems and production technologies adapted to climate change conditions in time and space through design of tools for improving crops, livestock, agronomic and natural resource management practices | |
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | CCAFS activities under this output are multi-disciplinary and span a range of scales from curation of nursery trial and weather data through to the development of a multi-scale methodological framework for the integrated assessment of climate smart options. Development of an automated data curation system for trial data has commenced and progress has been made in accessing and generating corresponding weather data for wheat and maize trial locations. These data, together with other GIS data layers (soils, aridity index, elevation etc), have been integrated in Geodatabase. Current and future analogues were created for wheat nursery trial sites (maize pending completion of georeferencing activities) and work has begun with Agtrials to create a batch upload format for meta, location and contact data for all nursery trials sites.<br>In addition to germplasm data, a wide range of data from different sources (short- and long-term agronomic trials) are being collated and analysed together with weather data associated with these trials in IGP (Nepal, India and Bangladesh) and East Africa (Kenya, Ethiopia, Tanzania). To evaluate the long-term benefits of CA, long-term trials have been established in IGP. Some of these trials are conducted under the aegis of CCAFS while others are in collaboration with regional projects (e.g. CSISA, BMZ, IFAD). The CCAFS-IFAD funded meta-analysis project led by CIRAD will benefit from these data.<br>Socioeconomic factors influencing adaptation and risk-management strategies in smallholder maize-based systems have been assessed using data generated from the SIMLESA project in Kenya. The majority of farmers applied ex-post adaptation and ex-ante risk-reduction strategies when faced with the most common climate risks (i.e. excess rain/flooding, crop pests and diseases) but a significant minority of farmers did nothing. Each type of climate risk was associated with individual patterns of adaptation strategies. While drought prompted replanting and selling of assets, excess rain/flood resulted in additional borrowing. The dominant risk reduction strategies associated with drought was the use of improved varieties that are drought and pests/disease-tolerant whilst soil and water conservation and crop diversification were preferred strategies to cope with excess rain/flood.<br>CIMMYT is developing a multi-scale methodological framework that will integrate data from the biophysical and socio-economic studies to assess different climate smart options. To date, the different challenges, options and data requirements for smallholder cereal-based systems have been identified and divided in terms of the scale at which they operate, from crop to region. The conceptual model was presented at the International Congress of Agronomy (Delhi, Nov. 2012). |
| **Output 1.1.3** New knowledge, guidelines and access to germplasm are provided for using genetic and species diversity to enhance adaptation, productivity and resilience to changing climate with benefits for socially marginal groups. | |
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | Under this output, CIMMYT aims to develop and promote comprehensive strategies for the improvement of wheat and maize using a combination of modelling, expert consultation and stakeholder engagement. The focus for wheat activities in 2012 has been the paramerisation of the DSSAT-CERES-Wheat model. Sensitivity analysis of the model to heat and CO2 has been completed and the results prepared for publication. These results and future plans and status of the International Heat Stress Genotype Experiment (IHSGE) dataset have been shared with AgMIP and a collaboration network has been established with the APSIM model development team in preparation for future wheat model evaluation and improvement.<br>The 2012 maize activity involved a comprehensive analysis and synthesis of germplasm data across different water and temperature regimes. Results confirmed that tolerance to combined drought x heat stress was genetically distinct from tolerance to individual stresses. Importantly, tolerance to either stress alone did not confer tolerance to combined drought x heat stress (Crop Science, submitted 2012) and confirm the importance of developing heat and combined drought x heat stress phenotyping capacity in SSA and IGP to evaluate current maize germplasm. Screening sites were established at seven different locations in the Indo-Gangetic Plain (India, Bangladesh, Nepal and Pakistan) together with the establishment of a phenotyping site for combined drought x heat stress screening in Melka Wera, Ethiopia. For capacity building an advanced training course on 'Precision phenotyping for abiotic stress tolerance in maize', including heat, drought and water-logging stress was held in India. Weather stations were installed in 22 key phenotyping locations in East and Southern Africa and a field-based training course on the use and maintenance of weather stations was held during 26-27 Nov 2012 in Ethiopia. The development of this phenotyping network will allow for the evaluation of resilience of key maize germplasm within each region together with key traits associated with tolerance and phenotyping capacity for ongoing modelling activities. These deliverables combined with climate projections will play an integral role in targeting both national and international breeding programs by identifying regions of vulnerability. |
| **Theme 2. Adaptation through Managing Climate Risk** | |
| **Objective 2.1 Identify and test innovations that enable rural communities to better manage climate-related risk and build more resilient livelihoods** | |
| **Outcome 2.1: Systematic technical and policy support by development agencies for farm- to community-level agricultural risk management strategies and actions that buffer against climate shocks and enhance livelihood resilience in at least 20 countries** | |
| **Output 2.1.1 Synthesized knowledge and evidence on innovative risk management strategies that foster resilient rural livelihoods and sustain a food secure environment** | |
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | CIMMYT is exploring several different but complementary modelling approaches to studying the likely impacts of increasing climate variability on farm household welfare, current adaptation strategies and policy interventions that could help buffer against climate variability. Two models are being adapted for the Ethiopian and one for the Kenyan household context. The Ethiopian Rural Household Survey date (IFPRI) has been used to parametrise the economic component of a model built within the agent-based software MPMAS environment. The probability of very dry, dry, normal, wet and very wet years has been determined for past (1960-2010) and future climates (2011-2040) and estimates produced of crop yields (maize and wheat) under current and future climates. The SIMLESA dataset will be used to further refine the MPMAS model and yields of additional crops (chickpea, dry bean and cowpea) will be simulated.<br>Another approach has been to model the farm-level impact of CA for different cropping systems using a GAMS environment. The model has been developed for one site in Ethiopia and estimates for yield response and carry-over functions have been generated. Refinement of the model requires input data for typical households at the selected site in Ethiopia, as the model is currently running on data from Kothapally and 'dummy' data for different maize/bean cropping systems. We also need to add climate variability together with key practices from CA. Lessons from this work are being used to inform the development of a bio-economic framework for maize/legume-based households in Kenya. |
| **Output 2.1.3 Development; and demonstration of the feasibility, acceptability and impacts; of innovative risk management strategies and actions for socially-differentiated rural communities** | |
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | Under this output CIMMYT aims to understand what practices farmers currently employ to reduce exposure to and impact of climatic variability and how more efficient provision of information services can enhance these risk management strategies. Participatory action research is being conducted in both IGP (India, Bangladesh and Nepal) and East Africa (Ethiopia, Kenya and Tanzania) to assess on-farm practices that contribute best to risk management strategies. In East Africa, under the SIMLESSA project, various field-level, on-farm and on-station trials (CIMMYT W3 funded) related to crop management, crop rotations and intercropping systems, weeds management, residue management and tillage systems, have been established and are being monitored. In IGP, CIMMYT is working with farmers' groups and cooperatives to enable farmers to collectively learn about various risks management strategies. For example, farmers are involved in testing crop diversification, no-tillage and residue retention trials in Punjab, Haryana and Bihar. Technology dissemination through farmer-to-farmer approaches has been very successful and many farmers have adopted no-tillage and residue retention as a means of saving energy and increasing resource use efficiency, especially water and nutrients. These participatory strategic trials are serving as learning modules for a large number of stakeholders including farmers, extension agents, researchers and policy planners. A large number of farmers (nearly 600) were trained on climate smart technologies. Two CCAFS participating farmers in Haryana grid were recognized with State Level award by the Chief Minister of the Haryana for their efforts on adaptation and popularization of climate smart technologies.<br>A household survey in IGP showed that farmers have access to multiple sources of information; more than 90% were obtaining information from other farmers in their own or neighbouring villages and 99% had access to mobile phones. Farmers placed greatest priority on inputs and pre-sowing information that was required to manage production risks. Mobile phones were found to encourage greater market participation and diversification towards high-value crops amongst poor farmers. Such changes have helped increase farm earnings through higher price realization and reduced wastage. Realising the full potential benefits of mobile phones is constrained by a set of factors that prevent farmers from leveraging fully the information they receive. The barriers apply more to the small farmers than their richer counterparts, and include shortcomings in physical infrastructure affecting access to markets, storage and irrigation. Issues regarding the availability of critical products and services including seeds, fertilisers, medicines and credit also exist for the farmers. However, as mobile penetration continues to increase amongst farming communities and information services continue to adapt and proliferate, the scope for much greater impact on rural productivity may be realised in the near future. |
| **Objective 2.3 Support risk management through enhanced prediction of climate impacts on agriculture, and enhanced climate information and services** | |
| **Outcome 2.3 Enhanced uptake and use of improved climate information products and services, and of information about agricultural production and biological threats, by resource-poor farmers, particularly vulnerable groups and women, in at least 12 countries** | |
| **Output 2.3.1 Improved, value-added climate information products, knowledge, tools, methods; and platforms for monitoring and predicting impacts of climate fluctuations on agricultural production and biological threats; to support management of agricultural and food security risk** | |
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | CIMMYT's 2012 activities have focussed on refining model outputs for high temperature impacts on crop production (in collaboration with Universities of Florida and Stanford). The initial analysis has concentrated on a few well-calibrated locations (i.e. irrigated wheat in India and Sudan) to 'train' a statistical model which can then be applied more quickly to many regions. A statistical model of spring wheat yield responses to temperature, based on data from historical trials conducted by CIMMYT, has been completed. The statistical model was then used to predict impacts of 1°C and 2°C warming at all locations. The sites within each country that were among the worst 20% of impacts were then identified as "hotspots". This process was repeated with 500 different iterations of the statistical model, to identify sites that are robust hotspots. We have also begun to apply the model to irrigated wheat sites around the world. Parallel simulations of fully irrigated wheat were performed using the APSIM-N, SALUS and DSSAT wheat models, for the same locations and climate files. The next steps will be to compare the statistical and process-based model estimates and then incorporate actual climate projections. The methodology developed in these projects will be shared with AgMIP and will become the foundation for temperature impact assessments in other climate vulnerable regions and hotspots and for future studies in rainfed regions.<br>In the case of maize, climate projections for both temperature and rainfall at the maize mega-environment level were developed for ESA using the outputs of 19 global climate models (submitted to Food Security). Changes in rainfall patterns were found to be highly variable, in many areas the total rainfall did not change, however the distribution of rainfall was altered. By 2050, air temperatures are expected to increase throughout maize mega-environments within sub-Saharan Africa by an average of 2.1 °C. |

## Theme 3. Pro-Poor Climate Change Mitigation

**Objective 3.2 Identify institutional arrangements and incentives that enable smallholder farmers and common-pool resource users to reduce GHGs and improve livelihoods**

**Outcome 3.2: Improved knowledge about incentives and institutional arrangements for mitigation practices by resource-poor smallholders (including farmers' organizations), project developers and policy makers in at least 10 countries**

**Output 3.2.1 Evidence, analysis and trials to support institutional designs, policy and finance that will deliver benefits to poor farmers and women, and reduce GHG emissions**

| | |
|---|---|
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | An analysis of the SIMLESA dataset of 900 sample households in rural Ethiopia indicated that for the adoption of climate smart agricultural practices (CSAPs) such as legume/maize rotations and reduced/zero tillage: i) strong cross-technologies interdependences exist and the highest payoff is achieved when CSAPs are adopted in combination suggesting that policy makers should promote packages of agricultural technologies; ii) to improve the adoption of multiple CSAPs, policy makers and development practitioners should seek to strengthen local institutions and technically capable extension service providers, maintain or increase household asset bases, and establish and strengthen social protection schemes (public safety-net programs); iii) as important is the provision of more reliable rainfall forecasts, not only in terms of amount but also in terms of timing and distribution; iv) strategies for improving productivity and minimizing the use of non-renewable inputs should combine improved seeds with appropriate CSAPs and v) education of women may be one of the most important factors influencing sustainable agriculture in Africa (Draft manuscript: 'Are there systematic gender differences in the adoption of joint sustainable intensification practices? Evidence from Kenya').<br>An assessment of the determinants of the adoption of conservation agriculture (CA) by farmers based on primary data collected from 972 farm households in Nepal, India and Bangladesh under the CSISA project. The analysis showed: a) farm size, irrigation status of the land, education of the household head, institutional membership and proportion of adult family members working on the farm were all positively associated with the likelihood of adopting CA, b) when country-specific differences were controlled, female-headed households and the households with female decision makers were found to be more likely to adopt CA compared to male-headed households; c) when compared to farmers in Nepal, farmers in India and Bangladesh are more likely to adopt CA.<br>An assessment of the factors determining women's level of participation in decision to sell and/or lease land showed that on large land holdings women are less involved in decision making regarding both the sale and lease of land. Country-specific differences were also observed as a higher percentages of women in Bangladesh were found to have fully participated in decision making as compared to women in India and Nepal. The higher the share of remittance income, female headship, and number of females studying the more likely female participation in decision making. |

**Objective 3.3 Test and identify desirable on-farm practices and their landscape-level implications**

**Outcome 3.3: Key agencies dealing with climate mitigation in at least 10 countries promoting technically and economically feasible agricultural mitigation practices that have co-benefits for resource-poor farmers, particularly vulnerable groups and women**

**Output 3.3.2 Methods developed and validated for GHG monitoring and accounting at farm and landscape level to contribute to compliance and voluntary market standards**

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| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | Data from on-farm and on-station trials are being used to estimate carbon sequestration and GHG emissions. We are using empirical models (eg. Cool Farm Tool) and other indices (eg. Carbon sustainability index) to indirectly estimate the C sequestration potential and GHG emissions of different management practices in major wheat- and maize-based cropping systems. Some of these analyses have been presented and published in workshop proceedings while some are in the process of submission to peer-reviewed journals. Preliminary findings in C sequestration and GHG emissions suggest that a shift from conventional to zero-tillage (ZT) increases the efficiency and carbon sustainability index of wheat production. ZT-based wheat production is estimated to reduce GHG emissions by 1500 kg $CO_2$ eq per hectare per wheat season compared to CT based system which would have a huge impact if adopted widely. For example, with current estimated area of 260,000 ha under wheat in Haryana state of India, current GHG benefit due to adoption of ZT is about 0.4 million tonne of $CO_2$ eq per year.<br>Measurement of GHG from two trials (one wheat-based and one maize-based cropping system trial) is on-going and measurement from another three trials (one in Haryana and two in Bihar) will be started in summer of 2013.<br>A gas chromatograph for systematic measurements of GHG has been purchased and a GHG analysis facility will be established at the BISA complex, Bihar. Two PhD students are currently being trained in the measurement of GHGs from agricultural systems and a further two will be trained in summer 2013. |

## Theme 4. Integration for Decision Making

**Objective 4.1 Explore and jointly apply approaches and methods that enhance knowledge to action linkages with a wide range of partners at local, regional and global levels**

**Outcome 4.1: Appropriate adaptation and mitigation strategies mainstreamed into national policies in at least 20 countries, in the development plans of at least five economic areas (e.g. ECOWAS, EAC, South Asia) covering each of the target regions, and in the key global processes related to food security and climate change**

**Output 4.1.2 Evidence on, testing and communication of, successful strategies, approaches, policies, and investments contributing to improved science-informed climate change-agricultural development-food security policies and decision making**

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| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | In 2012, CIMMYT has produced many communications outputs and actions that had climate change as a key theme, and many made specific mention of CCAFS (see below).<br>In December, the CIMMYT blog ran a report entitled "Climate smart practices and conservation agriculture in India," covering a traveling seminar organized by CCAFS, CIMMYT, Rajendra Agricultural University (RAU), and Indian Agricultural Research Institute (IARI) and involving nearly 100 participants, including 60 farmers from village clusters in the CCAFS grid in Vaishali district of Bihar.<br>In November, the CIMMYT blog reported on the visit of a Bangladeshi delegation to learn about CIMMYT conservation agriculture activities in India, which included participation of CCAFS farmers.<br>An October blog report covered the in-field stakeholder meeting 'Empowering Farmers for Climate Smart Agricultural Practices in Haryana' in Taraori, Karnal, India, on 28 September 2012, and which was organized by CCAFS and diverse national and farmer organizations and drew many Indian farmers, 50 officials from governmental and private sector organizations, and 25 scientists from national and international institutions.<br>In June, in the context of Rio+20 discussions and events, CIMMYT staff played key roles in a media briefing co-organized by ICRAF-World Agroforestry Center, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), CCAFS, and the United Nations Environment Program (UNEP). The event centered on efforts to address climate change challenges to agriculture, and was reported in the CIMMYT blog (see CIMMYT participates in Rio+20 media briefing in Nairobi).<br>In January, the CIMMYT blog pushed out the CCAFS web page note "Researchers Outline Food Security-Climate Change Road Map in Science" that describes a Science magazine article drafted by a group of international agriculture experts and urging scientists to lay the groundwork for more decisive action on global food security in environmental negotiations in 2012 (see What next for agriculture after Durban?).<br>Climate change features in CIMMYT messaging as a key challenge to sustainability and food security, and has been described along with mention of work as part of CCAFS in presentations by CIMMYT directors to audiences at scores of events during 2012. |

**Objective 4.2 Assemble data and tools for analysis and planning**

**Outcome 4.2 Improved frameworks, databases and methods for planning responses to climate change used by national agencies in at least 20 countries and by at least 10 key international and regional agencies**

**Output 4.2.1 Integrated assessment framework, toolkits and databases to assess climate change impacts on agricultural systems and their supporting natural resources**

**Regional site and baseline characterization**

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|---|---|
| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | Planning responses to climate change requires the collection and management of huge datasets at local, regional and global scales and the development and refinement of analytical frameworks for estimating the impacts of climate change and adaptation interventions. A framework that integrates biophysical models that simulate crop yields at a pixel level with socioeconomic models that provide aggregated economic impact at a global level is being validated. Long term (>10 years) yield trial data has been collected for maize and wheat from selected global experimental stations where CIMMYT collaborates with associated soil, weather and crop management data. These data have been used to calibrate and evaluate the biophyical models , and databases have been established for maize and wheat modeling that will be continually updated with new datasets. A method of estimating the impact of current and future climate extreme events has been also developed and tested. |

**Objective 4.3 Refine frameworks for policy analysis**

**Outcome 4.3 New knowledge on how alternate policy and program options impact agriculture and food security under climate change incorporated into strategy development by national agencies in at least 20 countries and by at least 10 key international and regional agenciesat least 10 key international and regional agencies**

**Output 4.3.2. Analyses of the likely effects of specific adaptation and mitigation options, national policies (natural resource, trade, macroeconomic, international agreements) including gender/livelihood groups, and communicated to key local, national and regional agencies and stakeholders**

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| *Prepare a succinct summary of activities and deliverables, organised by Output level of the CCAFS objectives* | The CERES-Wheat and CERES-Maize models embedded in DSSAT have been calibrated and evaluated with benchmark varieties using CIMMYT's global yield trial datasets. The models were run at a pixel level and then later aggregated to the desired spatial scale using GIS, and vulnerability maps showing global and regional changes in yield and production of wheat and maize by 2050 have been produced. The model outputs aggregated at food production unit (FPU) level have been fed into the global IMPACT model to examine the global and regional economic impact of climate change. Preliminary results have also been generated on the economic impact of extreme weather events on maize production in the USA and related effects on regional and global food production, trade and security. More specifically, the adoption of drought-tolerant wheat in regions vulnerable to climate change and its related effects on regional and global food and nutrition security has been analysed. |

# List of publications that acknowledge CCAFS support

(a) Each Program Participant must list all publications that acknowledge CCAFS support. Only include publications that came out in final version in the calendar year. Please do not include journal papers under review (submitted etc) or out in electronic format ahead of print, except of course for electronic-only journals.
(b) Please try to format references in the Harvard style. A clear guide can be found here: http://libweb.anglia.ac.uk/referencing/harvard.htm

(c) For journal articles, please indicate all of the references that are "green open access" with a single asterisk and those that are "gold open access" with a double asterisk. This is now a requirement from CGIAR donors. Green open access means that the authors have made a free copy available on a website. Gold open access means that the journal allows free download (either as standard practice or because the authors paid for it).
(d) For all publications that are up online, please provide a web link if possible. This will help us to advertise your work more widely.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

### Publication 1

| Type | Citation identifier |
|---|---|
| Book chapters | Verhulst etc al.2012 |

**Citation**

*Verhulst, N., Govaerts, B., Sayre, K.D., Sonder, K., Romero-Perezgrovas, R., Mezzalama, M., Dendooven, L., 2012. Conservation agriculture as a means to mitigate and adapt to climate change, a case study from Mexico. In: Wollenberg, E., Nihart, A., Tapio-Biström, M.-L., Grieg-Gran, M. (Eds.), Climate Change Mitigation and Agriculture. Earthscan, Oxon, ISBN: 9781849713924, pp. 287-300. (Online: http://imis.cimmyt.org/confluence/download/attachments/23069648/Verhulst_et_al_2012-ClimateChange-BookChapterShort.pdf).

### Publication 2

| Type | Citation identifier |
|---|---|
| Conference proceedings | Grahmann et al. 2012. |

**Citation**

Grahmann, K., Verhulst, N., Peña, J., Buerkert, A., Govaerts, B. 2012. Effects of Tillage-Residue Management and Dose and Timing of Nitrogen Fertilization on Durum Wheat Yield and Grain Quality in an Irrigated Bed Planting System in Northwestern Mexico. In: ISTRO 19th Triennial Conference Proceedings, Montevideo, Uruguay, 24–28 September.

### Publication 3

| Type | Citation identifier |
|---|---|
| Other | Vergulst et al. 2012. |

**Citation**

*Verhulst, N., François, I.M., Govaerts, B., 2012. Conservation agriculture and carbon sequestration: Between myth and farmer reality. Mexico, D.F., CIMMYT.

## Publication 4

| Type | Citation identifier |
|---|---|
| Working papers | Wollenberg et al. 2012 |

**Citation**

Wollenberg E, Herrero M, Wassmann R, Neufeldt H, Vermeulen S, Rosswall T, Campbell B, Hellin J, Jarvis A, Challinor A, Snook L, Smakhtin V, Kinyangi J. 2012. Setting the agenda: Climate change adaptation and mitigation for food systems in the developing world. CCAFS Working Paper no. 29. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. Available online at: www.ccafs.cgiar.org

## Publication 5

| Type | Citation identifier |
|---|---|
| Working papers | Thornton & Cramer 2012 |

**Citation**

Shiferaw B., Hellin J., Gerard B.,Braun H-J., Stirling C., Cairns J., Reynolds M., Prasanna B.M., Gbegbelegbe S., Ortiz-Monasterio I., Sonder K., Muricho G., Mittal S. 2012. Maize. In: Thornton, P. and Cramer, L. (eds.). 2012. Impacts of climate change on the agricultural and aquatic systems and natural resources within the CGIAR's mandate. CCAFS Working Paper 23. Copenhagen, Denmark: CCAFS. pp. 96-105.

## Publication 6

| Type | Citation identifier |
|---|---|
| Working papers | Mittal 2012. |

**Citation**

Mittal S. 2012. Modern ICT for Agricultural Development and Risk Management in Smallholder Agriculture in India. Working Paper No. 3. Socioeconomics, CIMMYT .

## Publication 7

| Type | Citation identifier |
|---|---|
| Working papers | Thornton & Cramer 2012 |

**Citation**

Shiferaw B., Hellin J., Gerard B.,Braun H-J., Stirling C., Cairns J., Reynolds M., Prasanna B.M., Gbegbelegbe S., Ortiz-Monasterio I., Sonder K., Muricho G., Mittal S. 2012. Wheat. In: Thornton, P. and Cramer, L. (eds.). 2012. Impacts of climate change on the agricultural and aquatic systems and natural resources within the CGIAR's mandate. CCAFS Working Paper 23. Copenhagen, Denmark: CCAFS. pp. 152-163.

# 2012 Case studies

Number of case studies to be submitted is dependent on budget size so please refer to the table on the explanatory notes. Each case study should be about half a page, and Program Participants are expected to build a portfolio of case studies over the years that demonstrate all different types.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

CASE STUDY 1

**Title**
Farmers' information needs to better manage production risk in the Indo Gangetic Plains of India.

**Author**
Surabhi Mittal

**Type**
Innovative non-research partnerships

**Date (DD/MM/YYYY)**

**Countries**
Indo Gangetic Plains (IGP) of India- five states Punjab, Haryana, Uttar Pradesh, Bihar and West Bengal

**Keywords**
Information needs, information technology, risk management, wheat, maize, rice

**Photo URL**

**Introduction/Objectives (400 characters)**
The main objective of this study was to identify the information needs of farmers, that enable them to manage risk in wheat, maize and rice cropping systems in the five states of Indo-Gangetic Plain (IGP) of India. The specific objectives were (i) to identify the existing networks, needs and constraints of farming households to access information in IGP, (ii) to analyze the factors that impact on the selection of information sources by farming households, (iii) to identify the extent of use of mobile phones by farmers for agricultural information, the for agricultural activities and farmers' perceptions on further use of mobile phones to manage production and marketing risks.

**Description of the project,, procedures etc. (1100 characters)**
Data were collected by CIMMYT through a primary survey of 1200 farming households in five IGP states (Bihar, Haryana, Punjab, Uttar Pradesh and West Bengal) of India. Multi-stage sampling techniques were used for selecting states, districts, villages and households for the study. Four districts were chosen in each state based on geographical locations. In each district six villages and in each village ten households were randomly selected. This survey collected information on socio- economic characteristics of households, household assets, access to different types and sources of information- frequency, timeliness and usefulness. A multivariate probit specification has been used to examine how different socio-economic factors influence the decision of farmers in adoption of different sources of information.

**Project results (be concrete as possible), innovate findings, novel outcomes and short discussion on the implication of these results (1100 characters)**
Three sources of agricultural information were assessed: India Farmers fertiliser Cooperative Limited (IFFCOs) Kisan Sanchar Limutred (IKSL), a voice-based model; Reuters Market Light (RML), a small message service (SMS)-based model; and Kisan Sanchar, a model which is both SMS-and voice-based (CIMMYT Socio-Economics Working paper no. 3. Surabhi Mittal, 2012).
In the surveyed sample almost all the farmers have access to mobile phone, but only ca. 40 % use mobile phones for accessing information relating to agricultural activities. Mostly service provides deliver information to the farmers on their mobile phones in the form of SMS. It is important to deliver information in the local language; 76 % of the farmers who own mobile are able to receive SMS in the local language. Low English literacy is one of the major constraints; only 51 % of farmers in IGP can read the SMS and hardly any (29 %) of the total farmers can reply in text form. Many of these farmers are unable to read the information/messages themselves. In India many mobile based information service providers are operational since 2007, but the survey highlights the relatively poor penetration or awareness of these services. The main reason for this given by farmers is that whilst they had heard about these services from others, they didn't understand the benefits and how to use these services and had no guidance on usability from service providers. Some also felt that the messages delivered were not relevant or useful and many felt that the charge was too high. Additional constraints relate to the lack of infrastructure, for example, in terms of input markets, seed production systems, insurance, credit and policies (price policy, subsidies on machines etc).
Messages delivered should provide an "actionable byte of information". Mobile-based information is the most suitable model and for its viability, it must address the low levels of English literacy amongst farmers and the need for information that is concise, relevant and timely.

**Partners involved and their role (250 characters)**
IFFCO Kissan Sanchar Limited (IKSL); Kisan Sanchar, RML. They were interviewed and their models were studies to draw this case study

**Links/Sources for further information**
Surabhi Mittal (2012): Modern ICT for Agricultural Development and Risk Management in Smallholder Agriculture in India. Working Paper No. 3. socioeconomics, CIMMYT

**Title**
Building capacity for climate change adaptation

**Author**
J Cairns and PH Zaidi

**Type**
Capacity enhancement

**Date (DD/MM/YYYY)**

**Countries**
Zimbabwe, Kenya, Ethiopia, India, Bangladesh, Pakistan, Nepal

**Keywords**
Capacity building, maize, climate change, adaptation

**Photo URL**

**Introduction/Objectives (400 characters)**
To ensure adaptation to climate change in the most vulnerable countries there is a need to create an enabling environment for technology transfer and strengthen the capacity of existing national institutes and the private sector.

CASE STUDY 2

**Description of the project,, procedures etc. (1100 characters)**

To raise awareness of the potential effects of climate change on maize production systems and develop long term in-country capacity to adapt maize systems to climate change, a series of capacity building exercises were undertaken in vulnerable regions of the Indo-Gangetic Plain (IGP) and East and Southern Africa (ESA). Genetic tolerance to combined drought and heat stress in maize is unique, and tolerance to drought stress does not confer tolerance to heat or combined drought and heat stress. In ESA many current drought donors and key inbreds used in widely-grown hybrids are susceptible to drought stress at elevated temperatures. Training courses to raise awareness and transfer knowledge of climate change and develop in-country phenotyping capacity were held in India and Ethiopia. Courses were attended by scientists and technicians from national institutes and seed companies from Ethiopia, Zimbabwe, India, Bangladesh, Pakistan, Nepal and Sri Lanka. Participating institutions included: Hawassa Agricultural Research Center, Bako Agricultural Research Center, DZ Agricultural Research Center, Kulumsa Agricultural Research Center, Melkassa Agricultural Research Center, EIAR, Jimma Agricultural Research Center, Worere Agricultural Research Center, National Meteorological Agency, IITA and CIMMYT-Zimbabwe.

**Project results (be concrete as possible), innovate findings, novel outcomes and short discussion on the implication of these results (1100 characters)**

Ongoing research developed under CCAFS was presented at capacity-building courses, with focus on downscaled climate projections for key regions, advances in knowledge of the effects of climate change on maize production and key research requirements to adapt maize systems locally to climate change. In IGP the training course focused on precision phenotyping for priority traits for climate change adaptation. In ESA the training course focused on strengthening climate monitoring within the national programs. Distilling information on climate projections with focus on local change helped raise awareness of climate projections and the need to re-focus research and development on climate-proofing maize systems. These training courses will help mobilise national research capacity and the private sector to strategically develop improved maize germplasm adapted to local conditions.

**Partners involved and their role (250 characters)**

Key national research institutes including EIAR, Bihar Agriculture University, University of Agricultural Sciences, Raichur, Bangladesh Agricultural Research Institute, Regional Station at Rajshahi, National Maize Research Program, Rampur, Maize and Millet Research Institute (MMRI) in Pakistan

**Links/Sources for further information**

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CASE STUDY 3

**Title**

Assessing the impacts of climate change and promising technologies using bioeconomic modeling

**Author**

Kindie Tesfaye, Uran Chung, Kai Sonder, Sika Gbegbelegbe, Bekele Shiferaw, Clare Stirling

**Type**

Policy advocacy

**Date (DD/MM/YYYY)**

**Countries**

Global

**Keywords**

Africa, climate change, bio-economic modeling, maize, climate change impacts

**Photo URL**

**Introduction/Objectives (400 characters)**

Climate change is posing unprecedented challenges to maize and wheat production worldwide; hence, it is threatening sustainable food security across the developing world. Three studies were conducted in 2012 to analyze climate change impacts: (1) Modeling the future of maize under a changing climate in Africa; (2) Global impact from the adoption of a promising wheat technology in Turkey, Pakistan and Iran; and (3) Global impact from an extreme weather event in the US.

**Description of the project,, procedures etc. (1100 characters)**

The procedure consists of bio-economic modeling that involves crop, spatial and economic modeling. The CERES suite of models in the Decision Support System for Agrotechnology Transfer (DSSAT) was used to calibrate and evaluate benchmark and promising maize and wheat varieties.
Crop and spatial modeling are combined to estimate maize and wheat productivity at regional and/or global scales under the baseline and future climates. The baseline climate is typical of the late 20th century (2000s) whereas future climates involve two Global Climate Models (GCMs), namely CSIRO-Mk3.0, and MIROC 3.2. The analysis used the Geographic Resources Analysis Support System (GRASS) to handle geographic data and DSSAT is deployed in a parallel fashion on a high performance computing cluster.
Economic modeling is used to estimate the impact of climate change and related investments on global food and nutrition security. The analysis uses the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT). IMPACT is a partial equilibrium model that projects future regional and/or global food security under various scenarios on population growth, income growth and future climates.

**Project results (be concrete as possible), innovate findings, novel outcomes and short discussion on the implication of these results (1100 characters)**

**Modeling the future of maize under a changing climate in Africa**
Biophysical analysis: Africa would face a 5-11% reduction in maize production by 2050 due to climate change; the reduction would be more severe in Western and Southern Africa than in Eastern and Central Africa.
Economic analysis: by negatively affecting food production worldwide, climate change would lead to an increase in the number of people at risk of hunger in Africa
**Impact of a promising technology adopted in Turkey, Pakistan and Iran**
Biophysical analysis: drought-tolerant wheat cultivars would enhance wheat yields under climate change as compared to conventional cultivars
Economic analysis: with drought-tolerant wheat cultivars, the number of people at risk of hunger worldwide could decrease by as much as 8.4 million people in 2050
**Extreme weather event on maize production in the US**
Biophysical analysis: extreme weather event would decrease irrigated and rainfed maize production in the USA by 1% and 13%, respectively; the US Corn Belt region would be the hardest-hit.
Economic analysis: after two consecutive extreme events in the USA, global maize prices would increase by 25%; thus, the number of people at risk of hunger across the developing world would increase by 4%.

The results have shown that climate change and associated climate extremes will reduce the yield of maize and wheat crops and increase world food prices leaving millions of people at the risk of hunger and poverty. Promising technologies such as heat and drought tolerant crop varieties have shown promising potential in minimizing the negative impacts of climate change. This calls for the need to invest more in drought and heat tolerance maize and wheat varieties and associated crop management technologies at global and regional scales in order to adapt to climate change and minimize shocks due to climate extremes.

**Partners involved and their role (250 characters)**

University of Florida collaboration on maize model calibration and evaluation.
IFPRI provided technical support and High Perforamnce Cluster Computing Environment.
NARS in Ethiopia, Kenya and Zimbabwe collaborated on soil and climate data colelction.

**Links/Sources for further information**

CASE STUDY 4

**Title**

What determines gender inequality in household food security in Kenya? Application of exogenous switching treatment regression

**Author**

Menale Kassie, Simon Wagura and Jesper Stage

**Type**

Social differentiation and gender

**Date (DD/MM/YYYY)**

**Countries**

Kenya

**Keywords**

food security, gender, discrimination, exogenous switching treatment regression, Africa, Kenya

**Photo URL**

**Introduction/Objectives (400 characters)**

This case study examines the food security of male- and female-headed households using rich household- and plot- level survey data generated by CIMMYT in Partnership with the Kenya Agricultural Research Institute (KARI). Specifically, we aim to answer the following questions: Are female-headed households more likely to be food insecure compared to male-headed households? If so, why? Using better data and more sophisticated econometric techniques than previously applied to this problem, we are able to disentangle the effects of different types of gender inequalities in agriculture to a greater extent than previously possible.

**Description of the project,, procedures etc. (1100 characters)**

Using recent household and plot survey data (2010/11) from maize-legume systems in rural Kenya, we examine the reasons why female-headed households (FHHs) are more likely to be food insecure compared to male-headed households (MHHs). Following Mallick and Rafi (2010), we use the household's own perception of food security status, which provides a better assessment of the food security situation throughout the year. The use of subjective measures, including self-reported poverty (see e.g. Deaton 2010, who argues for wider use of self-reported measures from international monitoring surveys) and people's subjective perceptions of their economic welfare (see e.g. Ravallion and Lokshin 2002 who used subjective economic welfare measures in Russia) is a growing field, and our paper represents one of the first applications to food insecurity.

Based on all food sources (own production+ food purchase + safety nets and welfare programs + 'hidden harvest' from communal resources), the respondents assessed the food security status of their households. This data was captured for the most recent past twelve months and the responses were grouped into the following four categories following Mallick and Rafi (2010): chronic food insecurity, transitory food insecurity, breakeven (autarky households), and food surplus made by the household as our outcome variable.

**Project results (be concrete as possible), innovate findings, novel outcomes and short discussion on the implication of these results (1100 characters)**

The econometric results confirm that FHHs are, in general, more likely to be food insecure than their male counterparts. However, we find that this cannot be explained by the differences in observable endowments alone; the exogenous switching regression treatment effects shows that even under the counterfactual conditions where MHHs and FHHs are made more similar, the FHHs still have less probability of food security. This indicates that there are important additional gender-specific sources of food insecurity that make the FHHs less food secure than the MHHs regardless of their observed characteristics.

These results have important policy implications; they imply that although some of the gender differences in food security could be addressed through policy interventions of various kinds, important differences – presumably linked to gender-specific social norms, and differences in the way in which male and female farmers are treated – would still remain. Nonetheless, our study does identify several openings for policy interventions that could address some of the gender imbalances in fairly short order. The determinants of food security results suggest that FHHs food security increases with number of traders and membership with rural institutions, land quality, and farm size, while distance to the market reduces the probability of food security. To the extent that gender-specific norms drive part of the difference in food security, as our results suggest, panel data analysis would help to show whether those norms are changing over time or not.

**Partners involved and their role (250 characters)**

Researchers from the Kenya Agricultural Research Institutes (Kakamega and Embu regional centers) and ICRISAT participated in the data collection process.

**Links/Sources for further information**

http://www.aes.ac.uk/
Membership area: Simon Wagura Ndiritu_gender-food-security-AES2012 conference.pdf

**Title**

Innovative Young Farmer's Cooperatives for Participatory Adaptation and Accelerated Adoption of Climate Smart Practices: A case of Haryana, India

**Author**

ML Jat

**Type**

nnovative non-research partnership

**Date (DD/MM/YYYY)**

**Countries**

India

**Keywords**

Farmer cooperatives, innovations, non-linear model of extension, participatory adaptation

**Photo URL**

**Introduction/Objectives (400 characters)**

Conventional farming practices in the Indo-Gangetic Plain (IGP) have led to serious problems in terms of land degradation, declining ground water, diminishing factor productivity, growing labour scarcity and high production costs. These issues partly explain why farming is perceived as being unsustainable and unattractive to rural youths. Frequent adverse weather events due to climatic variability further exacerbate these challenges.

The traditional linear system of agri-technology transfer is proving insufficient in terms of reaching farmers in time to make real-time decisions and provide access to new technologies to cope with the emerging challenges. As a result, non-linear extension approaches involving youths are now being explored.

CASE STUDY 5

**Description of the project,procedures etc. (1100 characters)**

Conservation agriculture (CA) offers a potential solution to the emerging challenges of natural resource degradation in the IGP. However, out-scaling these relatively knowledge intensive technologies and practices is not easy compared to Green Revolution technologies (new seeds, fertilizers and irrigation). Whilst significant effort has gone into the development and dissemination of new technologies, including climate smart practices, adoption has been slow. One of the major bottlenecks is the increasing average age of farmers and with this a tendency towards conservative farming practices. Also the migration of youths from farming and the linear approach of technology development, adaptation and dissemination have not helped. To address some of these issues, efforts have been made to motivate young farmers to join together through cooperatives to serve as single window services and knowledge centres. The aim of bringing young farmers together is so that the co-operatives can evolve as a suitable institutional mechanism for buying and sharing assets, such as expensive farm machinery, as well as new tools and techniques for real-time decision making for efficient use of resources.

**Project results (be concrete as possible), innovate findings, novel outcomes and short discussion on the implication of these results (1100 characters)**

With a group of 20 young farmers under the leadership of Mr. Manoj Kumar and Mr Vikas Chaudhary, took an initiative to form a society and had it registered as the "Society for Conservation of Natural Resources and Empowering Rural Youth". As the farmers' participation in technology development and adaptation is critical, a participatory strategic research platform was established under CCAFS at this village cluster to serve as capacity building and awareness creation platform for different stakeholders including farmers, extension agents, students, scientists and policy planners. More than 3000 people including top policy planners have been exposed to this work and its promotion of climate smart technologies. Through capacity building of these young farmers, they have now demonstrated/disseminated climate smart technologies to nearly 430 farmers who have benefited from an improved income (US$ 127 to 315 /ha/crop season) in the CCAFS cluster. In addition, information has been disseminated to a large number of farmers/extension agents in other areas through print and electronic media covering 70 local & National Daily newspapers and national news channels. The cooperative group are also communicating this model to the masses through their participation in various states, national and international level meetings.

In recognition of the contributions of these young farmers in demonstrating the workings of a new model of technology adaptation and dissemination, they were awarded by various organizations including State Level Innovative Farmer Award having Rs. 25,000 cash. They also received a special acknowledgement from the Chief Minister of Haryana on 23rd December, 2012 who announced incentives for the adoption and promotion of climate smart and resource-efficient technologies, primarily CA-based technologies and machinery. This model provides a good example of new approaches to technology dissemination by empowering youths in agriculture and through the use of non-linear extension approaches for real time access to value added information/knowledge for decision making under changing climates.

**Partners involved and their role (250 characters)**

Indian Council of Agricultural Research, State Department of Agriculture, Haryana Agricultural University- knowledge sharing centres, awareness/capacity building events etc, Haryana Farmers Comission- Policy support on new technologies, Society for Conservation of Natural Resources and Empowering Rural Youth for providing services and create awareness amongst farmers, private sector organizations- mobilizing farmers from other areas to demonstrate the model.

**Links/Sources for further information**

http://ccafs.cgiar.org/blog/how-secure-gains-made-agricultural-production-changing-climate
www.facebook/Society for Conservation of Natural Resources and Empowering Rural Youth

# 2012 Outcome report

Frequency of reporting outcomes is dependent on budget size so please refer to the table on the explanatory notes. (max 1 page)

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

OUTCOME 1

**What is the outcome of the research (use of research results by non-research partners)?**

The expected outcome of this research is that flagship institutional approaches will be identified and developed with farmers and key development agencies that directly enhance the adaptive capacity of wheat-based farming systems to the climate change in the Indo-Gangetic Plain (IGP). CIMMYTs activities under CCAFS have helped to empower rural youths in developing an innovative model for participatory adaptation and out-scaling of climate smart practices. Farmer cooperatives provide a new, improved approach to technology dissemination as well as a means of engaging youths in agriculture and alternative sources of employment. Resource management technologies, in general, and conservation agriculture (CA) based management technologies, in particular, are relatively knowledge intensive and require local adaption. The farmer cooperatives offer a means of providing services along with new and up-to-date knowledge on adaptation and large-scale adoption of new technologies. Also, farmer-to-farmer extension provides a more acceptable means of disseminating new technologies and achieving impact at the farm level.

**What outputs produced in the three preceding years resulted in that outcome?**

The main outputs that resulted in this outcome pathway are: the production of a growing evidence-base to support the climate smartness of CA systems (see CIMMYT publications and presentations listed in this and the 2011 annual report) and the development of a participatory strategic research platform at the village cluster to serve as capacity building and awareness creation platform for different stakeholders including farmers, extension agents, students, scientists and policy planners.

**What partners helped in producing the outcome?**

Central Soil Salinity Research Institute (ICAR), Haryana Agricultural Univeristy, Haryana State Department of Agriculture, Haryana Farmers Commission, Private Sector Seed companies, Cereal Systems Initiative for South Asia, International Plant Nutrition Institute and innovative farmers.

**Who used the output?**

Haryana State Department of Agriculture, Haryana Farmers Commission, Farmer organizations, Policy planners.

**How was the output used?**

The participatory strategic research platform was established under CCAFS at Taraori (Haryana, India) village cluster to serve as capacity building and awareness creation platform for different stakeholders. More than 3000 people including top policy planners have been exposed to this work and its promotion of climate smart technologies. Through capacity building of these young farmers, they have now demonstrated/disseminated climate smart technologies to nearly 430 farmers who have benefited from an improved income (US$ 127 to 315 /ha/crop season) in the CCAFS cluster. In addition, information has been disseminated to a large number of farmers/extension agents in other areas through print and electronic media covering 70 local & National Daily newspapers and national news channels. The cooperative group are also communicating this model to the masses through their participation in various states, national and international level meetings. In recognition of the contributions of these young farmers in demonstrating the workings of a new model of technology adaptation and dissemination, they were awarded by various organizations including State Level Innovative Farmer Award having Rs. 25,000 cash. They also received a special acknowledgement from the Chief Minister of Haryana on 23rd December, 2012 who announced incentives for the adoption and promotion of climate smart and resource-efficient technologies, primarily CA-based technologies and machinery. This model provides a good example of new approaches to technology dissemination by empowering youths in agriculture and through the use of non-linear extension approaches for real time access to value added information/knowledge for decision making under changing climates.

**What is the evidence for this outcome: Specifically, what kind of study was conducted to show the connection between the research and the outcome? Who conducted it? Please provide a reference or source.**

The information was collected through CCAFS/CIMMYT staff (Anil Kumar, BR Kamboj, Dalip Kumar) staff based at Karnal in consultation with the partners and secretary (Vikash Choudhary) and President (Manoj Kumar) of the farmers cooperatives. The synthesis of information/data collected from this study was done by ML Jat (CIMMYT) and the further progress is being monitored under CCAFS.

**What is the outcome of the research (use of research results by non-research partners)?**

The expected outcome of this research is for farmers to realise the benefits of modern Information and Communication Technology (ICT) through better access to information that helps them manage risk in an informed way. Through the awareness-raising work of CIMMYT, the Kissan Sachar has been able to further developed their service provision model, increase their exposure of other funding agencies which in turn has enabled further up-scaling of the model and better information service provision to smallholder farmers.

OUTCOME 2

**What outputs produced in the three preceding years resulted in that outcome?**

The products of CIMMYTs research have been perceived as an independent and credible source of assessment of ICT-based innovations in the agricultural sector and the performance of some of the key players. This evidence base and raising of awareness has helped service providers to upscale their activities. Research products include:

Mittal, S. 2011. ICT for small-scale agricultural development and risk management in India, CIMMYT Socioeconomic Program Working Paper.

Mittal, S. 2012. Modern ICT for Agricultural Development and Risk Management in Smallholder Agriculture in India. CIMMYT Socioeconomics working paper no. 3.

Paper presented on 'ICT for reaching the stakeholders' on December 20, 2012 at the International Conference on Statistics and Informatics in Agricultural Research- : 66th Annual Conference Indian Society of Agricultural Statistics, New Delhi

The Role of Mobile Phones in Agriculture Growth at the Mobile plus Conference- Inclusive Growth through Mobile application- 17, September 2011, MSSRF, Chennai

Invited Lecture on Role of ICT's in Agricultural Development at Training Program at Division of Agricultural Economics, IARI, New Delhi on 4th September 2012.

Paper presented on Impact of Mobile Communication in Improving Agricultural Productivity at Smallholder Farms at the National Conference on Livelihood Security of Smallholder Farmers, on 19 August 2010 at NASC Complex, New Delhi organised by IFFCO Foundation (India).

Paper presented on Role of Modern Communication to Improve Farm Productivity at International Conference on Food Security and Hunger Management, 28-30 July, 2011 organised by Vishwa Yuvak Kendra (VYK), International Youth Center

**What partners helped in producing the outcome?**

Kisan Sanchar, IFFCO Kissan Sachar Limited (IKSL), CABI Delhi and progressive farmers.

**Who used the output?**

Kissan Sachar, Krishi Vigyan Kendras (KVKs), Input dealers, Farmers, Extension department, Village Panchayats, National Bank for agriculture and rural development (NABARD).

**How was the output used?**

Kissan Sanchar is an enterprise-class communication platform to broadcast text and voice messages on agricultural to individual framers on the mobile phones. At the time of the case study on Kissan Sanchar they were operating through a web-based interactive platform to broadcast messages to registered subscribers in local languages. Scalability and funding was a major concern for sustainability and expansion of this model. The case study by CIMMYT and continuous interactions raised the profile and credibility of the Kissan Sanchar model which served to motivate the Kissan Sachar team, raise their visibility and so help upscale their activities.

The CIMMYT case study provided an opportunity to the Kissan Sachar team to evaluate their innovative model and documented their work. This documentation helped them to win the 'Vodaphone –Mobile for Good 2011 award' and one million rupees (approx. 18 thousand USD) for up-scaling their activities. They then registered their venture as a non-profit company and expanded from just a SMS-based system to mobile-based inbuilt applications. They have also combined forces with mobile phone manufacturers such as MAX and Spice to include an inbuilt application in the handsets to improve the reach of mobile phones and agri-information to rural locations and targeted farmers and at a low cost.

The information that is being primarily delivered to farmers is generated by content and knowledge experts at various KVKs on managing production risk due to climate change (e.g. use of non-chemical fertilisers to improve soil health, use of inputs that improves water absorption and water retention in soil; animal husbandry- improving milk production and managing livestock health that is being effected by climate variability). Young children of farmers in villages are also being sensitised to this information through printed adverts on the last two pages of school notebooks. The local government body at the village level' Panchayat- is being exposed to use of internet to gather and distribute information- e-panchayats are developed under the Kissan Sanchar. A total of 6000 farmers in 419 villages of District Kurushetra of Haryana, India are now linked with government extension system under this venture. Also 150 volunteers across 110 districts in 9 states of Northern India are trained as information networks to improve small farmers reach ability to information related to climate adaptation and mitigation. A centralised Helpline call centre has been established and soon all of these will be linked to the inbuilt mobile based application of Kissan Sanchar. The owner of this venture acknowledges the case study conducted by CIMMYT as an important inspiration as well as a source of credibility among funding agencies which is helping them to improve their reach to the stakeholders and mainly farmers.

**What is the evidence for this outcome: Specifically, what kind of study was conducted to show the connection between the research and the outcome? Who conducted it? Please provide a reference or source.**

The information on this outcome was collected through interview with the head of Kisan Sanchar Mr. Kamaljeet. It was conducted by Dr. Surabhi Mittal, CIMMYT. Further monitoring and evaluation of this outcome pathway will be undertaken by CIMMYT in 2013 and beyond.

# Gender and Social Differentiation related activities summary report - 2012

CRPs that have presented their Gender Strategy to the Consortium in 2012 should show progress in 2013 in relation to implementing the Strategy. Therefore it is expected from Program Participants that findings of gender and social differentiation activities and their significance to be referred in this summary report. It is essential to relate progress towards outcomes to the baseline gender-differentiated conditions being used to measure change. This report should also refer specifically to what is being learnt about gender and how this knowledge is being used to inform research priority-setting and approach. If none or few of your activities integrate gender please explain why it is not relevant to your research portfolio.

## CCAFS Center Led Activities
## CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo

In 2012, two case studies on gender with household data from Kenya, India, Bangladesh and Nepal were conducted. In addition, an awareness raising and capacity building field activity to empower rural women in India was implemented. Finally, a gender screening of current CIMMYT's CCAFS gender activities took place to provide recommendations on how to strengthen and better streamline CIMMYTs gender activities in CCAFS for 2013 onwards.

Key findings of gender and social differentiation activities include:

• Empirical results from research in Kenya show that female-headed households (FFH) are, in general, more likely to be food insecure than their male counterparts. This cannot be explained by the differences in observable endowments alone which indicates that there are important additional gender-specific sources of food insecurity that make the FHHs less food secure than the male-headed households regardless of their observed characteristics.

• Empirical results from research in India, Bangladesh and Nepal show that women in families with large landholdings are less involved in decisions regarding both the sale and lease of land. On the other hand, increased access of women to information, the higher the level of female education and more remittances all served to increase women's participation in land-sale decisions by the household. Country-specific differences also exist; in Bangladesh more women participate fully in decisions on land sales and leases compared to women in India and Nepal.

• Field research and capacity building activities in India showed that training and capacitating smallholder women farmers, whose husbands have migrated, can be a successful means of empowering women to adapt and adopt improved farming practices that help them to harvest more with fewer costs and lower use of resources such as energy and water. The women farmers adopt new technologies and used them not only to enhance agricultural productivity but also to reduce drudgery and generate employment opportunities through collective action.

The following lessons can be derived from CIMMYT's activities: Gender norms and relations play important roles in determining inequalities in resource endowment and decision-making. These are country- and region- specific and thus cannot be generalized. In order to increase adoption of agricultural technologies, women need to be empowered and gender relations addressed. Access to information, training and education are key factors in all regions. Since gender norms and relations play important roles in all studies, alternative forms of research and training are important.

Household approaches and gender-transformative approaches which include also men in the empowerment processes seem to be the most promising to address gender imbalances in households and thus achieve a higher adoption of climate smart agricultural technologies, increase yields and reduce poverty and gender inequalities, especially in cases where men are still present in the household. In situations where men have migrated, direct work with women including awareness rising, capacity building, access to information, and participatory approaches for technology selection seem to offer the greatest promise for increasing productivity and addressing issues that are important to women such as a reduction in drudgery and additional income opportunities.