Scenario assessment of sustainable rice production systems. Exploring plausible, probable and possible futures for sustainable rice production systems

OBJECTIFS

During the first year of the project, major efforts have targeted (1) to share the concepts and methods undertaken by the different disciplines and partners engaged in the project , (2) to elaborate a common framework for designing a more precise and coordinated plan for actions (3) to definitively choose the geographical areas where the case studies could be conducted in Italy, Madagascar and Sierra Leone (Camargue in France was already decided) (iv) to create collaborative platforms with stakeholders and other scientists in those areas and (v) to start the collect of data, to finalize the choice and start the development of the more relevant tools for implementing the integrated assessments in the various areas. During the second year of the project, we stressed on making operational the different tools developed in each WP while improving and detailing the exchange of information and complementarities between them.

ACTIONS

The WP1 is responsible of running simulations of rice cropping systems performances (as yields and other variables related to quantitative and qualitative aspects of rice productions) under different environmental (climate) and agricultural (cropping practices) conditions. For that purpose, we rely on two sets of models: the generic model STICS (developed in EMMAH, Avignon, France) and the rice specific model WARM and the generic simulator CROPSYST (the former developed and used in the Cassandra lab, University of Milano, Italy). STICS has been calibrated simulating for rice for both the Lomelina and Camargue region and other crops (notably wheat, Alfalfa) for the Camargue region, whereas WARM is specifically dedicated to rice and adapted to both Camargue and Italy, and CropSyst is calibrated to simulate wheat and maize in the Lomelina region in Italy. Concerning Rice, STICS can take into account nitrogen shortage and fertilization practices ; WARM does not take into account the impact of fertilizations on yield but allow to simulate cold induced spikelet sterility and the effects of climate on grain quality, as well as the impact of blast disease. We decided (1) to compare their outputs for the common variables they are able to simulate for rice in both Camargue and Lomelina areas and (2) to use their specificity as much as possible in order to get the most out of their complementarity. In 2014, the main focus was on the cross calibration of WARM and STICS for rice. Field data collected in the two case studies were shared between French and Italian rice partners to calibrate and evaluate model performances. The phenological development, the evolution of leaf area index (LAI) and the final value of aboveground biomass (AGB) and yield collected in the field experiments carried out in Camargue and Lomellina in the period 1984-2009 were

RESULTATS

In 2014, the WP2 stress on two major tasks :
(1) In the Camargue study case we worked on developing, with the stakeholders, scenarios of change for the agricultural systems, identifying the main drivers acting and exploring the possible futures and the way farmers could adapt ; in the meantime we also improve and broaden the data base of agricultural activities in order to be able to take into account new activities (crops) or new organizations as a farmers' response to these changes (CAP reform).
(2) In Lomellina, data about the farming and cropping activities were gathered and analyzed in preparation of activities to be held in 2015: the development of scenarios, and the use of models for the integrated assessment of these scenarios. Stakeholders were contacted to organize early in 2015 a workshop for scenario development.
(3) In Sierra Leone, preliminary works related to the implementation of the Scenarice framework were conducted during a three month stay of post-doc Andrea Porro in the Makeny region. A survey was used to get data about the cropping and farming system. More than hundred farmers were interviewed, and the data were recorded in a database.
The analysis of this database led to the description of the diversity of cropping activities, as well as to a proposition of a first classification of the farming systems. The next step originally planned was to work on developing the scenarios, however, the Ebola outbreak prevented the continuation of the activities of Scenarice in Sierra Leone for now.
(4) In 2014, activities in Madagascar were conducted through the work of Clementine Maureaud (master thesis within the Scenarice project) who spent more than three months in the Ambohibary region. She received the support of Cara Raboanarielina (AfricaRice) who hosted Clémentine 3 weeks at the headquarter of AfricRice in Cotonou.

PERSPECTIVES

(Benin) prior to her stay in Madagascar and then visited Clémentine in Madagascar; as well as of Eric Penot (CIRAD) who was based in Madagascar during Clémentine's stay. The activities conducted in Madagascar consisted in pursuing the application of the methodological framework developed within the project for the participatory development of scenarios by select farmers and stakeholders to identify and evaluate possible adaptation strategies to climate and other global and local changes. Based on the farmers' interviews conducted in 2013 to understand the current systems and constraints to create a farm typology, focus groups were held to identify the main drivers of change and develop four scenarios notably related to climate change, existing infrastructure, access to market, and labor availability. These scenarios were then applied in the context of four farms selected to represent each significant farm typology noted in the study site