iSAT, the new generation digital agro advisory tool that empowers farmers to manage climate risks

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AICCRA
Accelerating Impacts of CGIAR Climate Research for Africa

iSAT, the new generation digital agro advisory tool that empowers farmers to manage climate risks

Key findings

- International Livestock Research Institute (ILRI) scientists collaborated with Jokolante, a Senegalese Agritech company, the Senegalese National Meteorological Agency (ANACIM) and the Regional Center for Improvement of Plant Adaptation to Drought (CERAAS) of the Senegalese Institute of Agricultural Research (ISRA) to develop a climate advisory service through a decision tree process known as iSAT, which is intended for smallholder crop and livestock farmers.

- The iSAT process builds context-specific and real time climate and agro-advisory information available through ICT. As of September 2022, weekly climate informed agro-based advisories using IVR voice messages (18 994 in local languages-Wolof, Pula), which have been sent to 2720 (23.5% women-led farms) registered users via Jokolante.

- Climate informed agro-advisories developed with iSAT are now integrated into the SAIDA app (A Food and Agriculture Organization of the United Nations [FAO] tool for Senegal administered by the National Agency for Agricultural and Rural Council (ANCAR) with a potential national reach of 84,000 producers.

- With iSAT, the Accelerating Impact of CGIAR Climate Research for Africa (AICCRA) project significantly aids crucial on-farm decisions so that smallholders get more yields from their farms. Common uses of iSAT in the project areas are decisions on the selection of crop types and varieties, timing of planting and harvesting, and in-season adjustment of inputs or target outputs.

Why a next generation advisory tool?

Managing climate risk in rainfed farming systems is becoming more difficult because of the increased complexities of atmospheric dynamics which significantly contribute to climate variability and change. Climate information services have become an indispensable part of climate risk management for sustainable agriculture. We therefore present a next-generation digital advisory tool (the intelligent Agricultural System Advisory Tool - iSAT) designed to help smallholder farmers in managing climate risks through timely, location- and crop-specific forecast-based agro-advisories.

AICCRA in Senegal included piloting and validating various climate-smart innovations in agriculture to boost agricultural productivity and improve smallholder farmers' livelihoods. Among the climate-smart technologies currently being implemented is the forecast-based agro-advisory system iSAT. iSAT incorporates pre- and in-seasonal decision trees developed by integrating both climate forecast (long- and medium-range forecasts), crop, and soil conditions to inform site-specific crop planning before the season and for tactical management during the season.

Approach

Structure and technical performance of the tool

- The tool contains two components i.e., pre-and in-season decision trees (DT)
- It uses the seasonal climate forecast (SCF), and historical weather and crop performance records all together well integrated with a process-based crop model to develop a pre-season decision tree to inform **crop and forage planning**
- Proven to be computationally cost-effective with excellent performance across digital platforms
- Enhanced by automated near-real-time data/information acquisition and linkage between the components in the system to increase user experience.
- Automated data analyses and enhanced visualization to increase user experience and facilitate decision-making among stakeholders and policymakers.

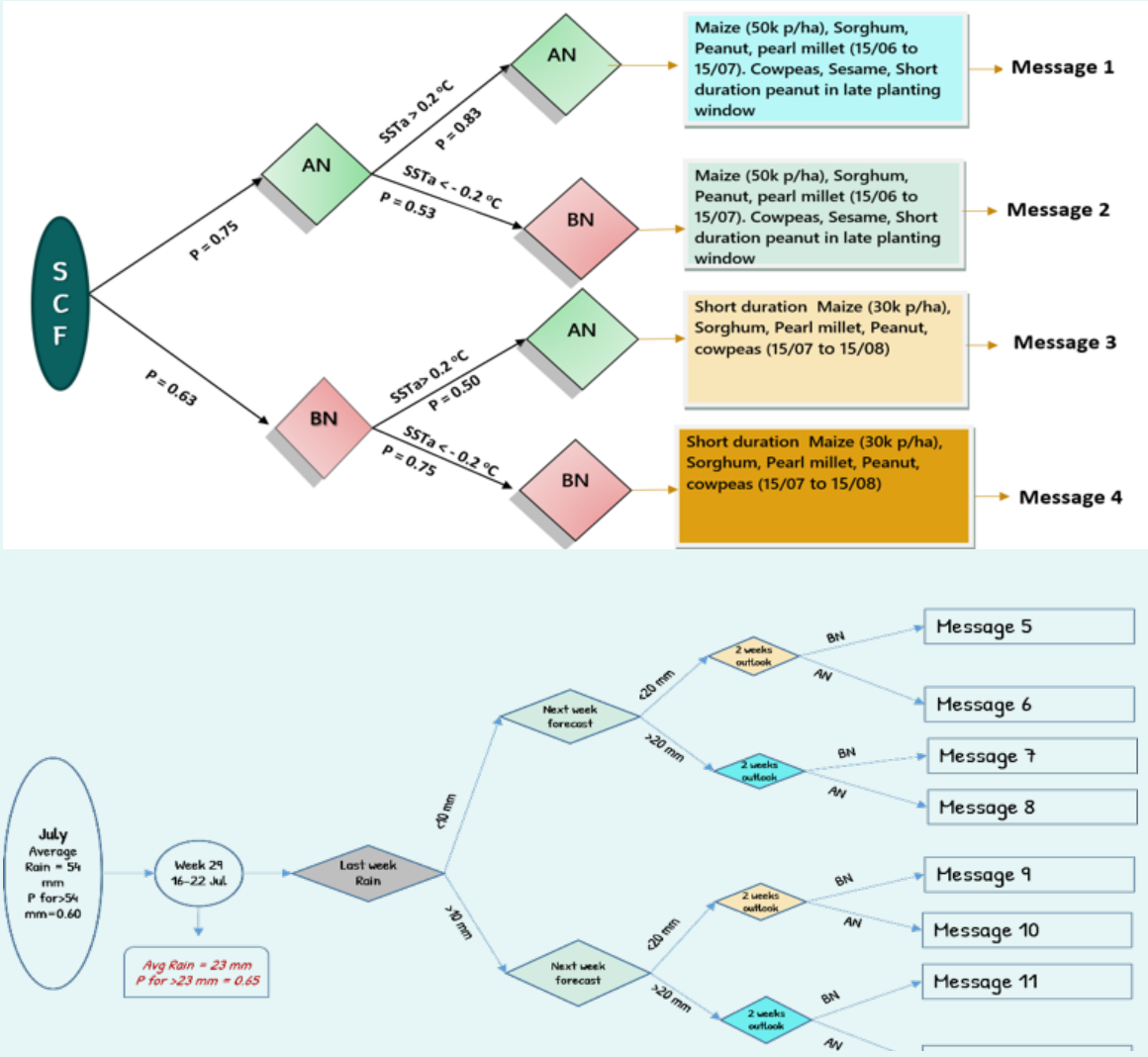

Figure 1: iSAT decision trees i.e., pre-season decision tree (a) and in-season decision tree (b) to guide on-farm level decision throughout the growing season.

Scaling of iSAT

We started disseminating the pre-season and weekly advisories in the three clusters, i.e., Dagua Birame, Meoune, and Thiel, in June 2022. The agro-advisories are developed and translated into Wolof and disseminated via the Jokalante platform as voice messages (IVR). Below are examples of pre- and in-season advisories disseminated in the 2022 wet season:

Pre-season advisories (19 June 2022)

Normal to above normal season is forecasted, i.e., a higher chance to receive at least 350 mm of rain. The season is the potential to grow sorghum, peanut, pearl millet, and cowpea in the early planting window—late June to late July when at least 20 mm of rain is expected. There is a high chance of having a mid-season break. We encourage closer follow-up of the weekly forecasts to complement the seasonal forecast. Consider appropriate water-conserving tillage practices, varying plant populations within the farm, use of drought-tolerant short to medium cultivars, and planting in an early planting window when you receive at least 20 mm of rain to minimize the risk.

In-season advisories (24 June 2022)

The monsoon is not active yet in this region. However, some areas have received a small amount of rain in the past ten days. There is a low probability of getting at least four rainy days in the next ten days. Continue with land preparation. Sowing can be done only if the soil moisture is sufficient with 20 mm or more of rain.

In-season advisories (17 July 2022)

Dry periods continued in this region in the past ten days. High chance of getting light to moderate rainy days with some dry days in the next seven days. You are advised to get ready with all the necessary inputs. Sowing can be done when an adequate amount of rainfall, and there is enough soil moisture on your farm.

Before sending the agro-advisories, the lead farmers and extension agents were invited to a week -long capacity-building training on the uptake and use of climate information services (CIS) and climate-smart agriculture (CSA) technologies. The participants were trained to interpret, communicate and use climate forecasts and agro-advisories. The training aimed to improve lead farmers' and extension agents' access to and ability to communicate and use CIS and CSA technologies at the village level.

Beneficiaries' profile

As part of implementing the climate-informed advisory, Jokalante was selected to ensure the dissemination of climate information bundled with agro advisory information in local languages to producers. Before the implementation, a survey was conducted in the different intervention zones of the project to enroll and profile the beneficiaries. This profiling allows us to better define the target, with its telephone number code and geographical area to target context-specific weather messages.

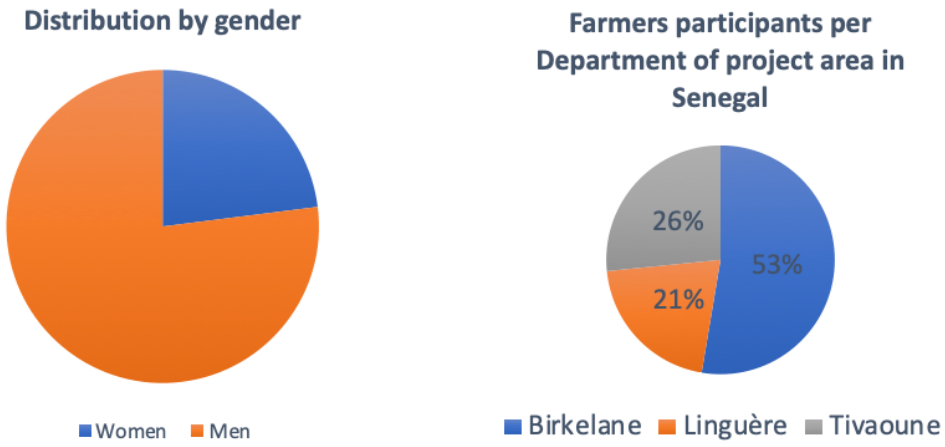

Figure 3: Beneficiaries' profiles per department and gender.

Most of the beneficiaries speak "Wolof", the popular spoken language in rural Senegal. A few of them speak "Pular" and "Sévère". Another source of information for the population is the radio station. About 86%, 91% and 92% of people listen to radio MABO, MBEULEUP and NDIOGNICK respectively. For the THIEL commune, it appears that JABBA JULA FM radio is the most listened to (44%), followed by RTS LOUGA (32%). RTS THIES and SUD FM radio remain the radio stations most listened to by respondents in the municipality of MEOUANE, at 41% and 20%, respectively.

Districts	Rated Best time for listening to information	% of respondents
MABO	07h to 10h	57%
MBEULEUP	11h to 13h	53%
NDIOGNICK	07h to 10h	80%
THIEL	20h to 22h	55%

Source: Jokalante, profiling survey July-August 2022.

Key feedback from beneficiaries

Photo 1: Aissatou Ndimbrane, Daga Birame village

"I can only applaud the work of the AICCRA project, which, as everyone here knows, provides support to producers. Thanks to AICCRA, we now can have information on rainfall and the duration of the rainy season, but also to know the best time to sow, to grow or even to apply fertilizer. Also, with this partnership, we can identify which seeds to use in case of rainfall abundance or scarcity. And all this without effort or cost because the information reaches us via our cell phones".

Photo 2 : Aladji DIOP, village of Ndombé, Méouane. Member of GIE Diambar

"The partners who provide us with climatic information greatly help us, especially in our fieldwork. Before, I had big challenges in predicting whether it would rain or not. In the past, I left early in the morning to plow my plot and after that a huge storm destroyed everything. I can only acknowledge this project initiative, which has allowed us to obtain better yields. I invite those in charge of the project to expand these types of actions throughout Senegal to contribute to the country's food self-sufficiency".

Key feedback from partners

Climate information services (CIS) have emerged as a key input for adaptation decision-making aiming to strengthen agricultural livelihoods by managing climate risks. Thus, AICCRA Senegal aims to reach and impact over 275 000 farmers and value chain stakeholders with informed climate-informed agro-advisories and new climate-smart agricultural packages and technologies. The AICCRA Senegal project focuses on 'dryland' agriculture and mixed crop-livestock systems. It has strategically partnered with the ISRA at the Centre of Excellence for Dry Cereals (CERAAS), and the national extension agency ANCAR, in addition to ANACIM. Via this three-way partnership, for the first time, these national agencies with the national mandate for climate (ANACIM), extension (ANCAR) and agronomic and crop research (CERAAS) work together to develop integrated climate information services and CSA. Additional partnership with the private sector (agri-tech companies) Jokalante and a community radio union (URAC) has been negotiated to target various audiences and reach multiple scales.

Jokolanté has developed a strategy and an approach to estimate the rural audience. This strategy is based on the population census added to the data collected at the level of the radio that we use. There is also a whole approach that we implement on the ground that we capture in our platform. From this platform, we can display out the audiences of the global populations according to the zones (urban and rural), their gender and age groups. And, with the free service and the profiles of each listener, we have the possibility of knowing the listening hours and the centers of interest. A technique that allows us to have quantitative data through audiences but also to assess the quality of programs with the populations who are exposed to these messages.

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Photo 4: Amy Kebe, Director of Jokolante Agritech

"As part of the AICCRA project, we are involved in dissemination of climate information and agricultural advice for producers in the corn, millet and peanut value chains. We are working on profiling producers to structure and identify their needs. For Jokolanté, we arm farmers with information about their center of interest, their commodities, field of production and the climatic events that occur in their production zones. This customization step is of paramount importance for the producer because it informs the user for decision-making to improve productivity.

There is a focus on gender because in the profiling work carried out, we systematically highlight the number of women concerned and their activities. This means that we include their speculations, their farming practices, and their areas. So, when the messages are sent, special attention is given to these profiles of women who receive the information to allow them equal opportunities to improve their agricultural production."

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Photos credit:
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