Accelerating and amplifying systemic transformation of agri-food systems with the digitalization of research and advisory services in Senegal

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Better lives through livestock

ILRI
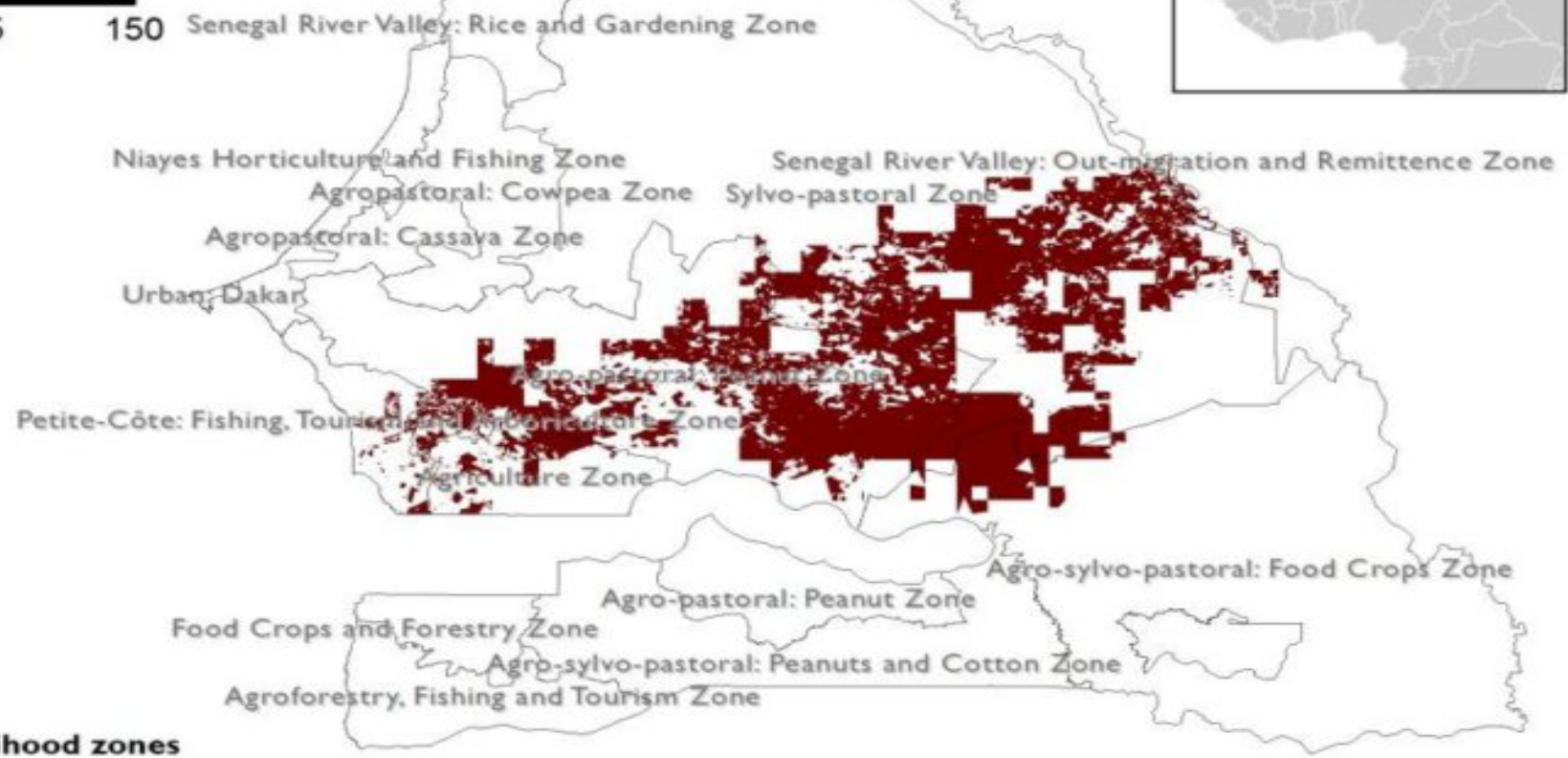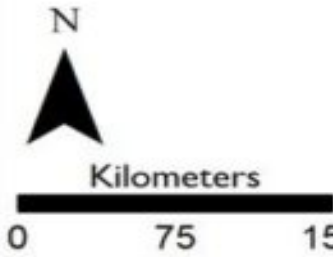INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

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Accelerating the Impact of CGIAR
Climate Research for Africa

Aggravating climatic factors

Livelihood zones

Senegal River Valley: Rice and Gardening Zone

Niayes Horticulture and Fishing Zone
Agropastoral: Cowpea Zone
Agropastoral: Cassava Zone

Urban, Dakar

Senegal River Valley: Out-migration and Remittence Zone
Sylvo-pastoral Zone

Petite-Côte: Fishing, Tourism and Arboriculture Zone

Agro-pastoral: Peanut Zone

Agriculture Zone

Agro-sylvo-pastoral: Food Crops Zone

Agro-pastoral: Peanut Zone

Food Crops and Forestry Zone

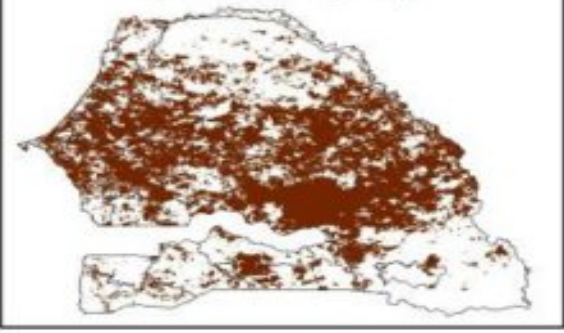Agro-sylvo-pastoral: Peanuts and Cotton Zone

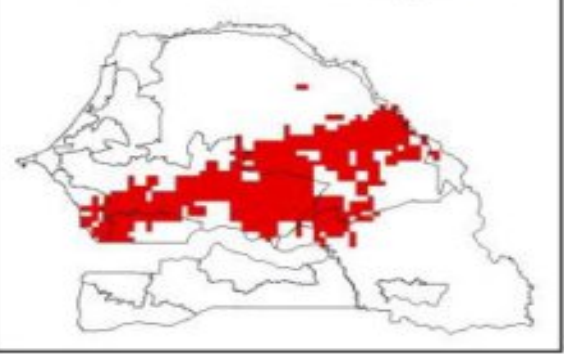Agroforestry, Fishing and Tourism Zone

Legend:
- Livelihood zones
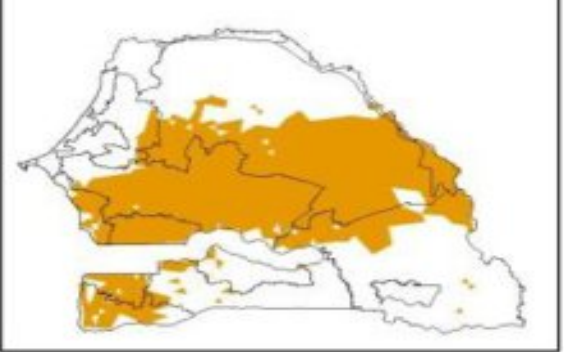- Aggravating climatic factors

Frequency of poor growing seasons (2 out of 10 years)

Variation in start of rainy season

Dry spell length - 4 days

WFP, 2012

The map highlights, in red, areas where food insecurity is potentially at risk due to climatic factors.
The map shows areas where there is high variability in the start of the rainy season, a poor growing season in two out of ten years, and a dry spell length of 4 days.
[NB: at this stage, we consider that if a poor growing season occurs more frequently or there is a longer dryspell, it is not feasible to carry out insurance projects.]

Coping with climate risk – tactical?

- Selection of crop types and varieties, animal breeds
- Timing of planting, harvesting, breeding, gestation and birthing
- In-season adjustment of inputs or target output (e.g. grain vs graze)

Risk reducing measures

- Insurance
- Forward selling, contracts,
- Climate knowledge, digital ag and ICT

Coping with climate risk – strategic?

Re-designing farming systems

- Historical and future climate analyses and modelled scenario analysis

- Co-design of the farm system for resilience and market opportunities

- Infrastructure and institutions to enhance adaptive capacity

1. Intelligent agricultural Systems Advisory Tool (ISAT): Tool to respond to Tactical+ Strategic

- ISAT : Next-generation digital advisory tool (ISAT) designed to help smallholder farmers in managing climate risks through timely, location- and crop-specific forecast-based agro-advisories

- Feature :

| Data Analytics | → | Decision Tree | → | Messages | → | Dissemination |

1. Identify farmers' strategic and tactical decision
2. Analyses of variability and trends in the historical climatic conditions
3. Assess the climate impacts in crop productivity using crop simulation models
4. Establish thresholds and triggers for key drivers that influence farmers' decisions.

1.1. Intelligent agricultural Systems Advisory Tool (ISAT): Data Analytics

1.1.1.Seasonal rainfall characteristics

1.1.2. Maize yields distribution

Rainfall
Z-score: 1.81
p-value: 0.07*

Rainy day
Z-score: 1.06
p-value: 0.29
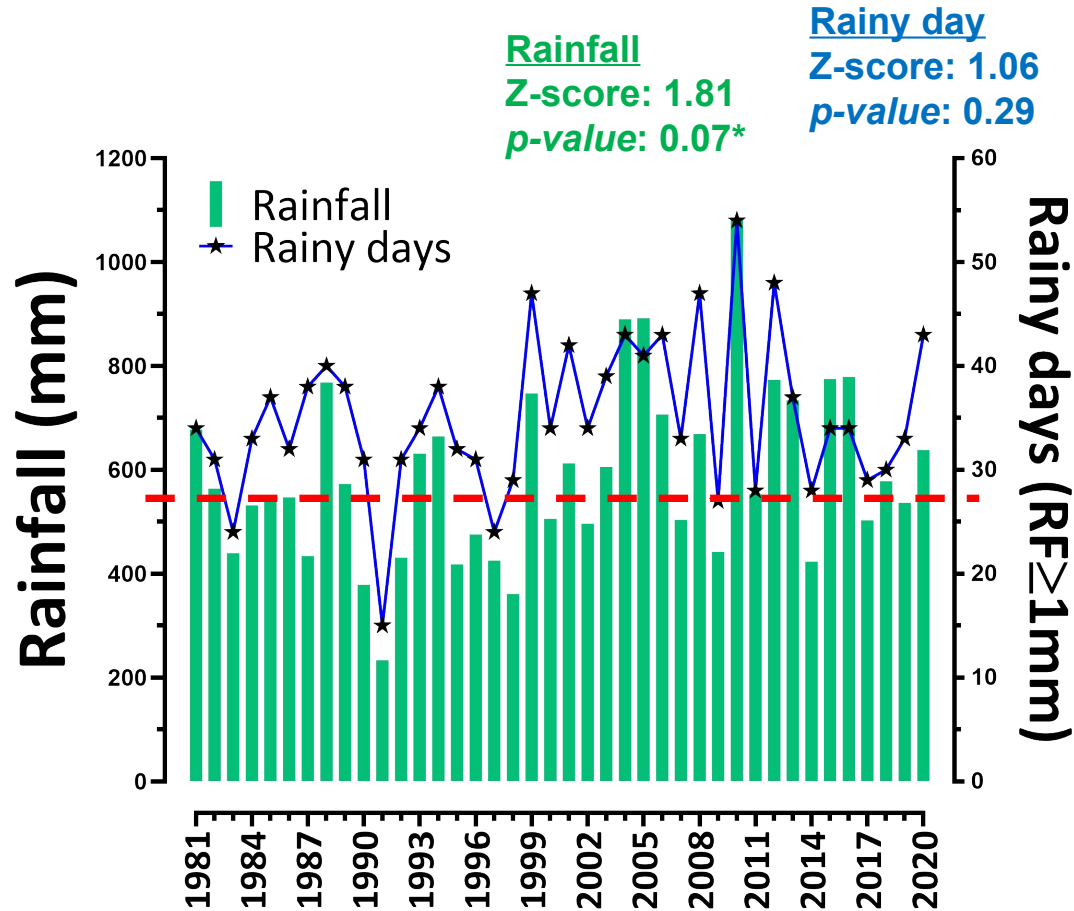
Mean: 3.31 t ha^{-1}
CV : 59%

Fig 1: Seasonal rainfall distribution and trends in Kaffrine from 1981 - 2020
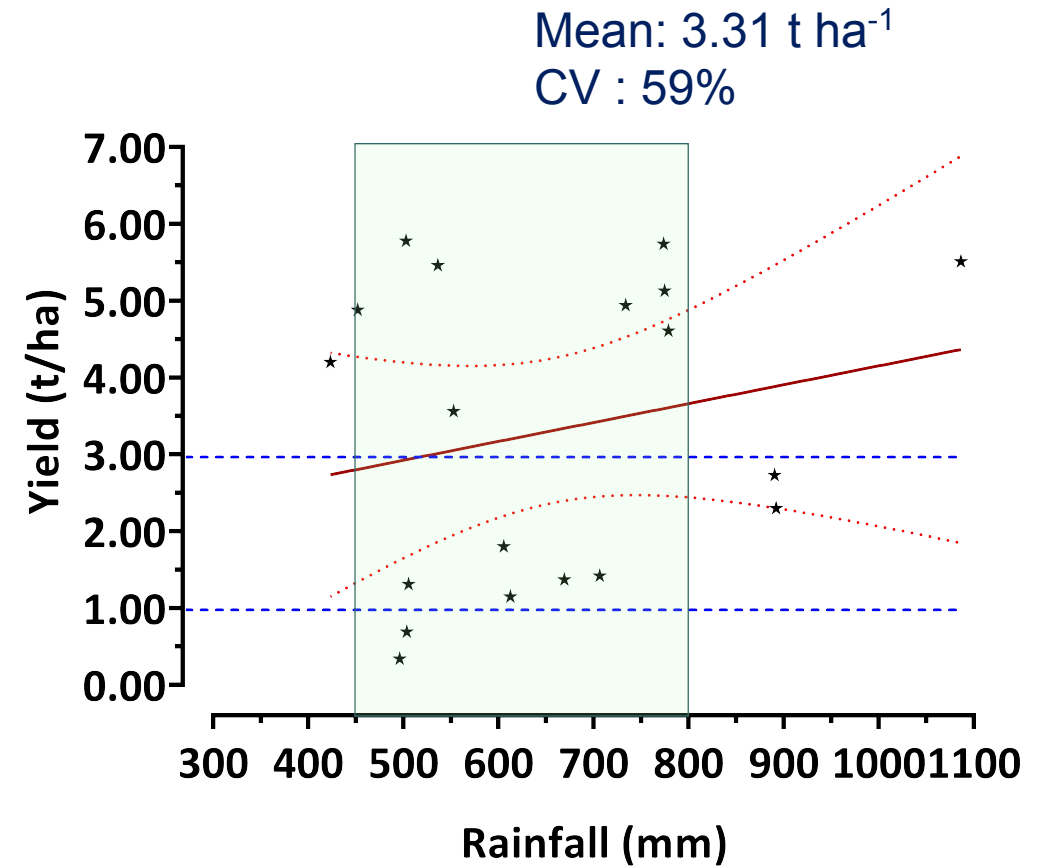
Fig 2: The relationship between maize observed yields and the amount of rainfall during the crop season in Kaffrine

1.2.1. Pre-season
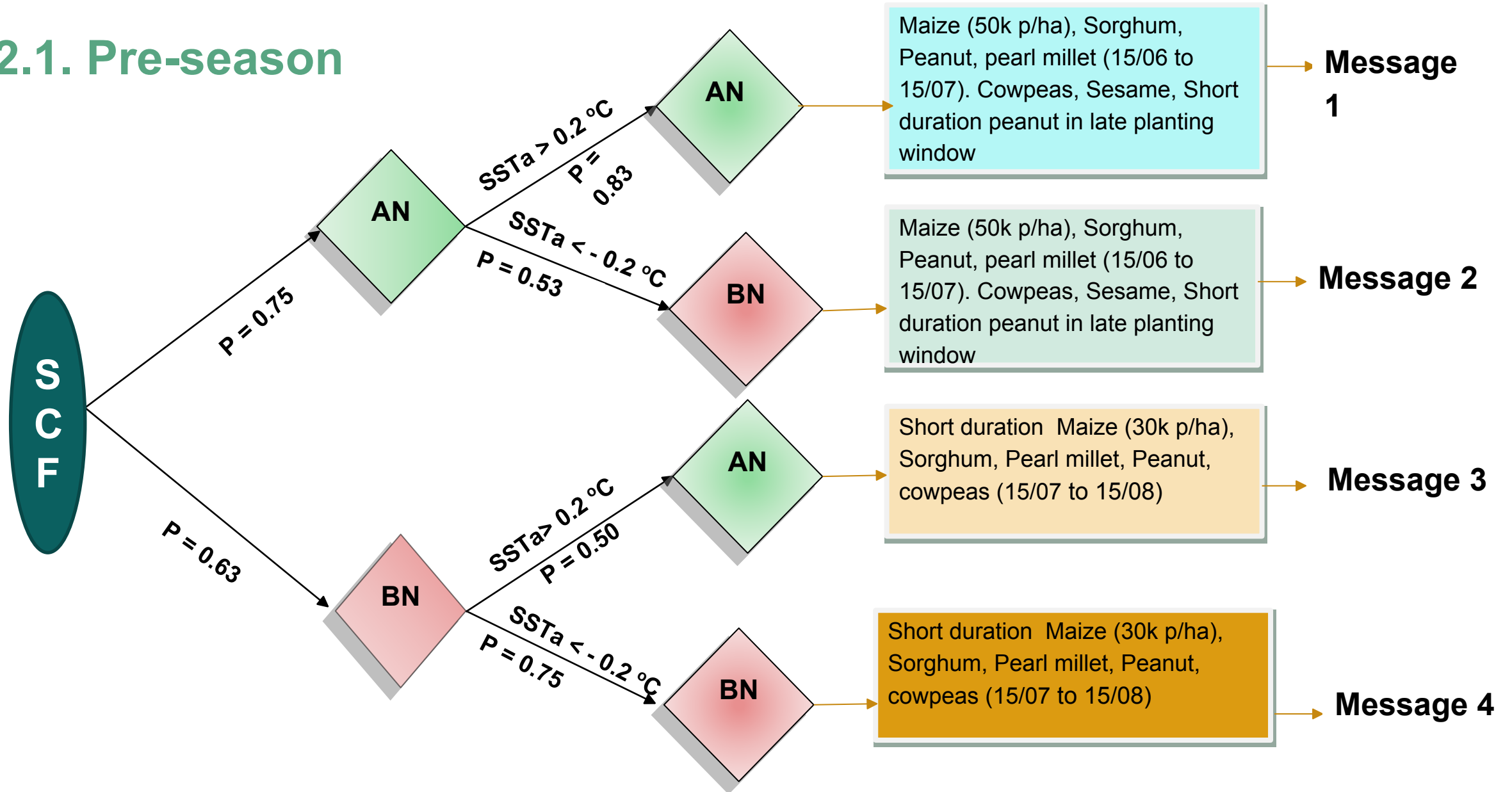
Fig 3 Decision tree for pre-season *Note: SSTa over Atlantic from ECMWF, SCF from ANACIM*
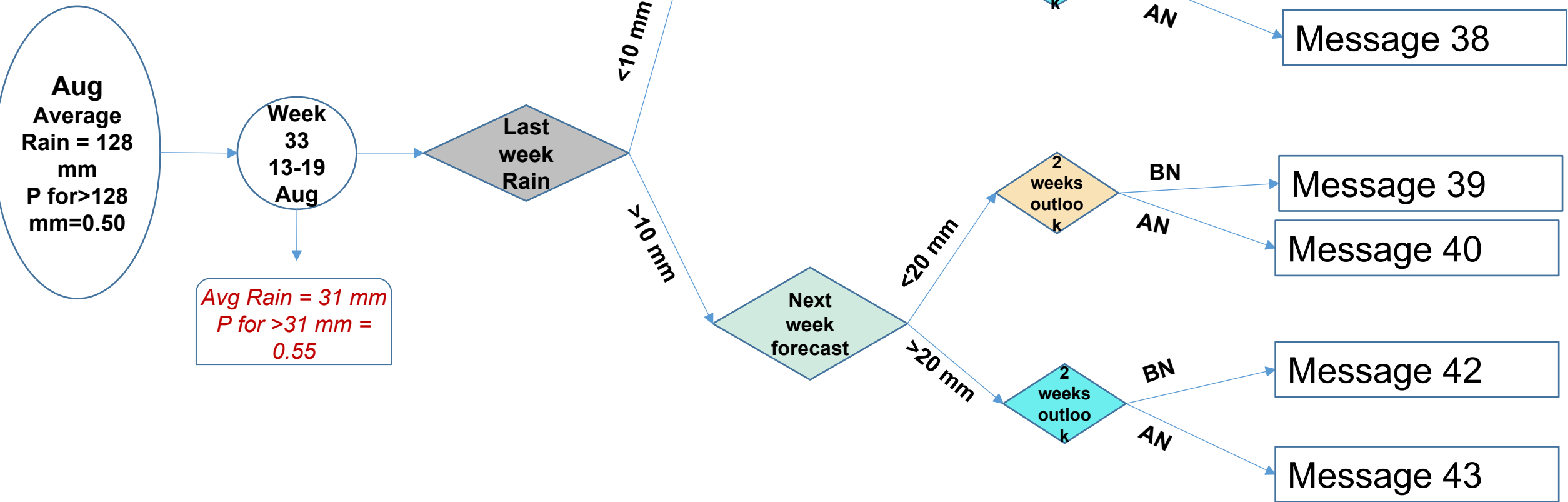
1.2.1. In-season

Fig 4 Decision tree for in-season

1.3. Intelligent agricultural Systems Advisory Tool (ISAT): Messaging

1.3.1. Advisories : Pre-season (Strategical)

Dagua Birame - Kaffrine : Normal to above-normal forecasted. High probability of high rainfall, at least 450mm. The season is potential to grow short to medium duration maize, sorghum, millet, peanut, and cowpeas in the 15 June to 31 July planting window when you receive at least 20mm of rain

Advisories : In-season – 16 – 22 July 2022 (tactical)

Dagua Birame - Kaffrine : Dry periods dominated with few rainy days observed in some areas in the past 10 days. Light to moderate rainy days is expected in the next seven days. Get ready for fertilizer application, weeding, and replanting. However, these operations should be performed when an adequate amount of rain is received and there is enough soil moisture on your farm.

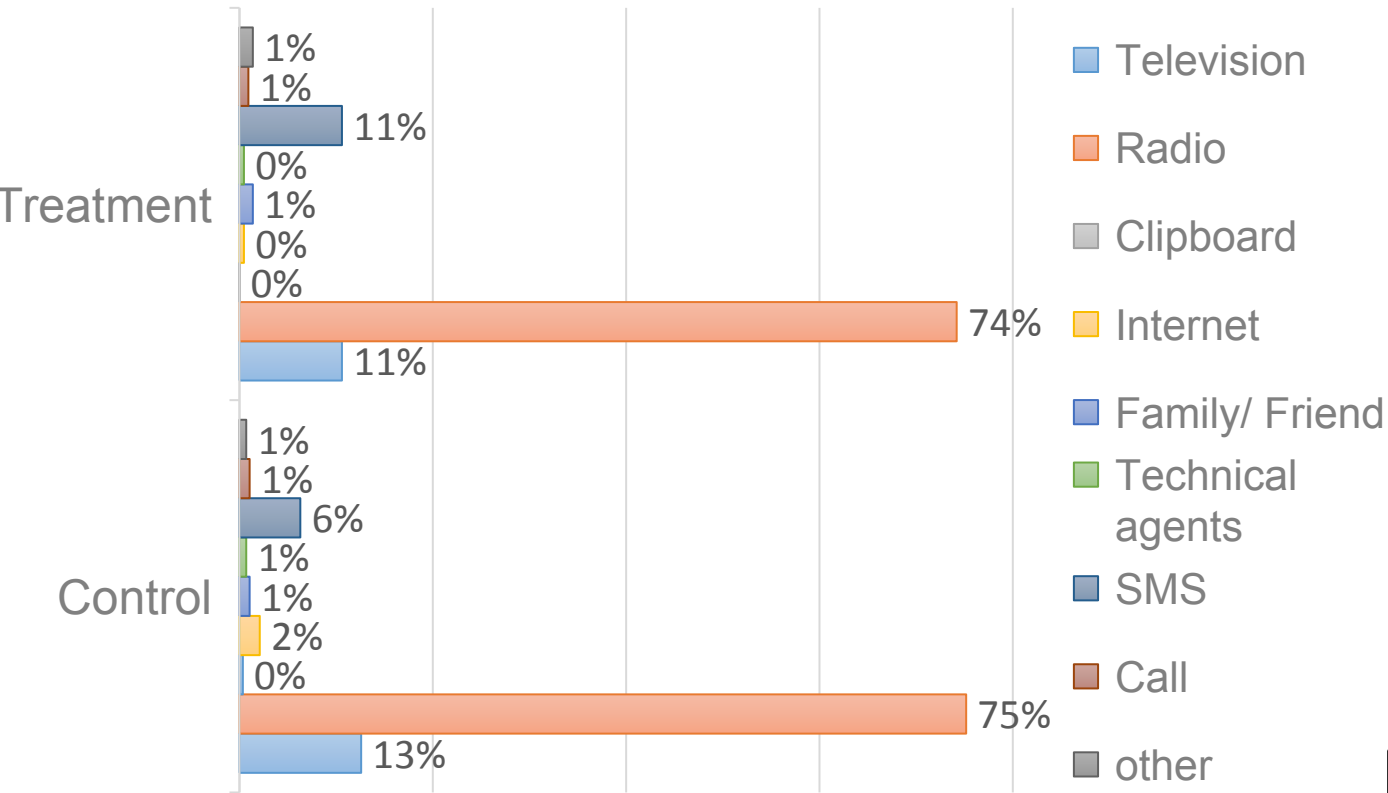# 2. Leveraging farmer demand to drive scaling and sustainability

3. Dissemination

Fig 4 Baseline information on the use of CIS
Source: Jokalante, profiling survey July-August 2022

- IVR (18,994 voice messages in local languages-Wolof, Pula) to 2720 (23.5% women led farms) registered users via agri-tech company

- July-Sept 2022: 4 radio stations in the focus regions broadcast a total of 60 programs on CSA and CIS, reaching 328 104 listeners.

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

4. Developed partnerships and mechanisms for mainstreaming climate services and agro-advisories
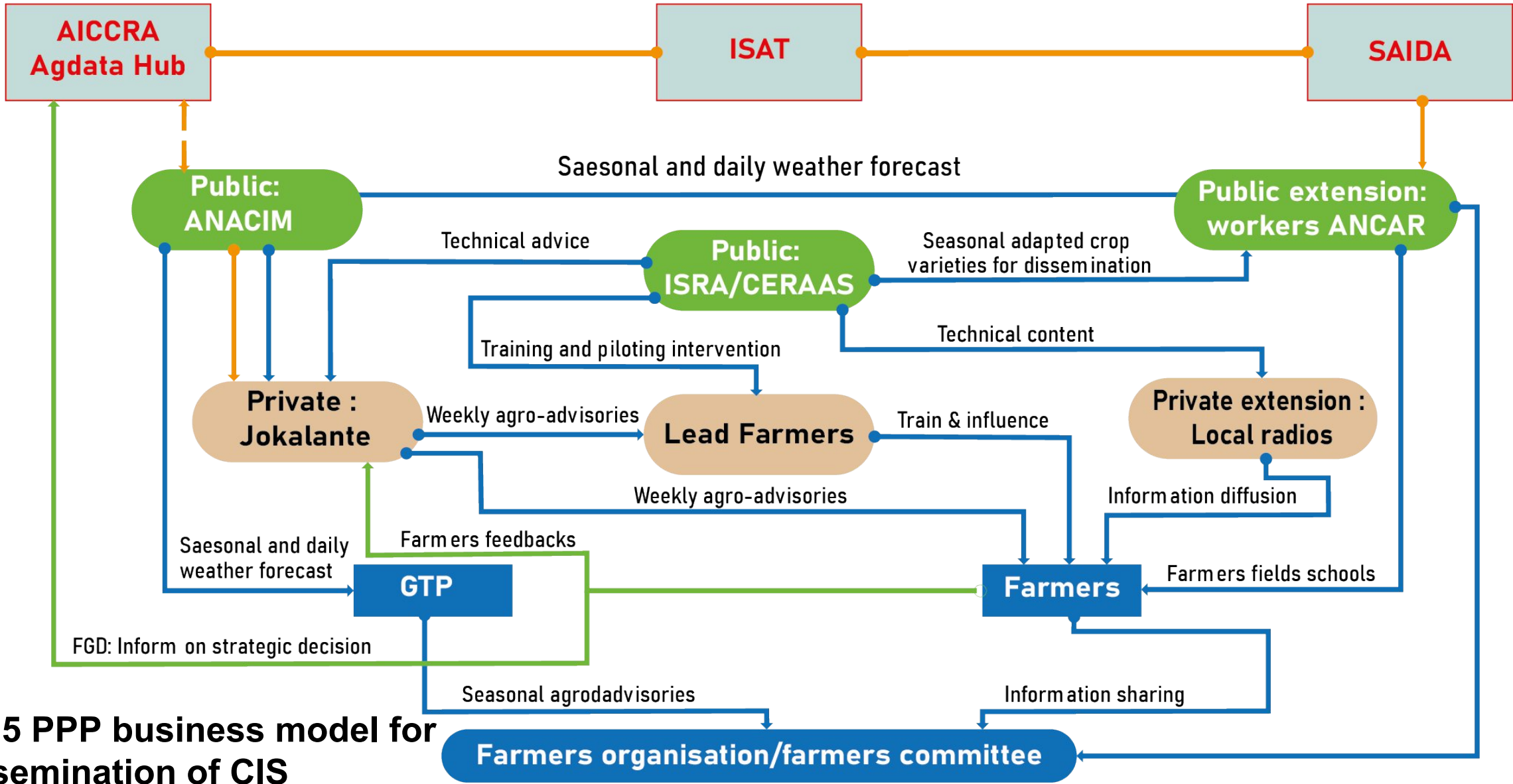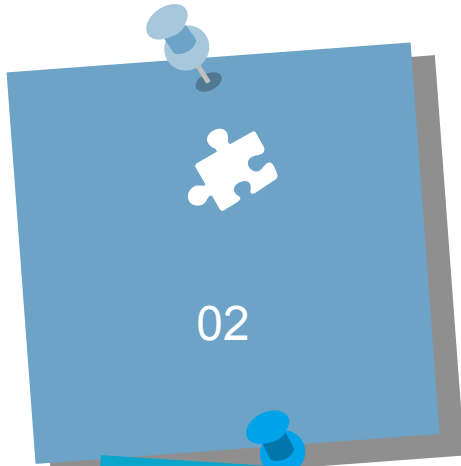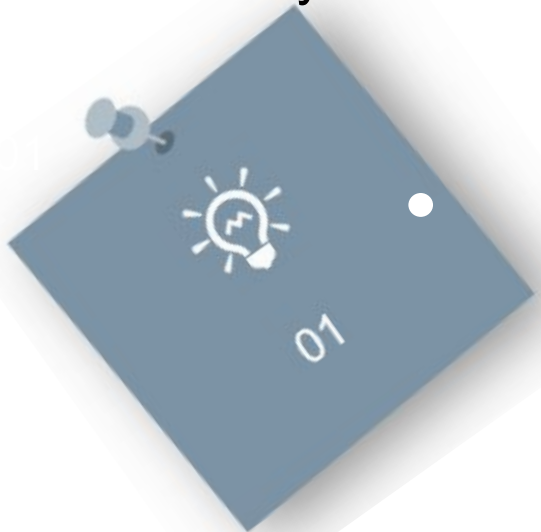

Fig 5 PPP business model for dissemination of CIS

5. Conclusion

1. Key innovations

- Embedding climate services in agricultural extension

- Balancing public and private sector comparative advantage

- Exploiting digital innovation within a diverse delivery strategy

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2. Key opportunities

- Bundle CIS and CSA to support sustainable agrifood transformation

- Content upgrades of CIS within the SAIDA app (FAO tool for Senegal administered by ANCAR) with a potential national reach of 84 000 producers.

3. Perspectives

Upgrading key decision points that relate to weather or forecasts in tree-crop-livestock systems : (1) Understanding of life cycle of a product line, (2) co-development of new decision trees. e.g. fodder harvesting; points in the reproductive cycle where temp stress may be important

Thank You