

Managing climate risk in crop-livestock systems in Senegal and Tanzania



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**Unlocking the Genetic Potential of Grain-Fodder Crops in Mixed Farming Systems,
28 March 2025, CIMMYT, Mexico**



Introduction and motivation



Challenges of current CIS and AAS



iSAT development and deployment



Evaluation of iSAT agro-advisories



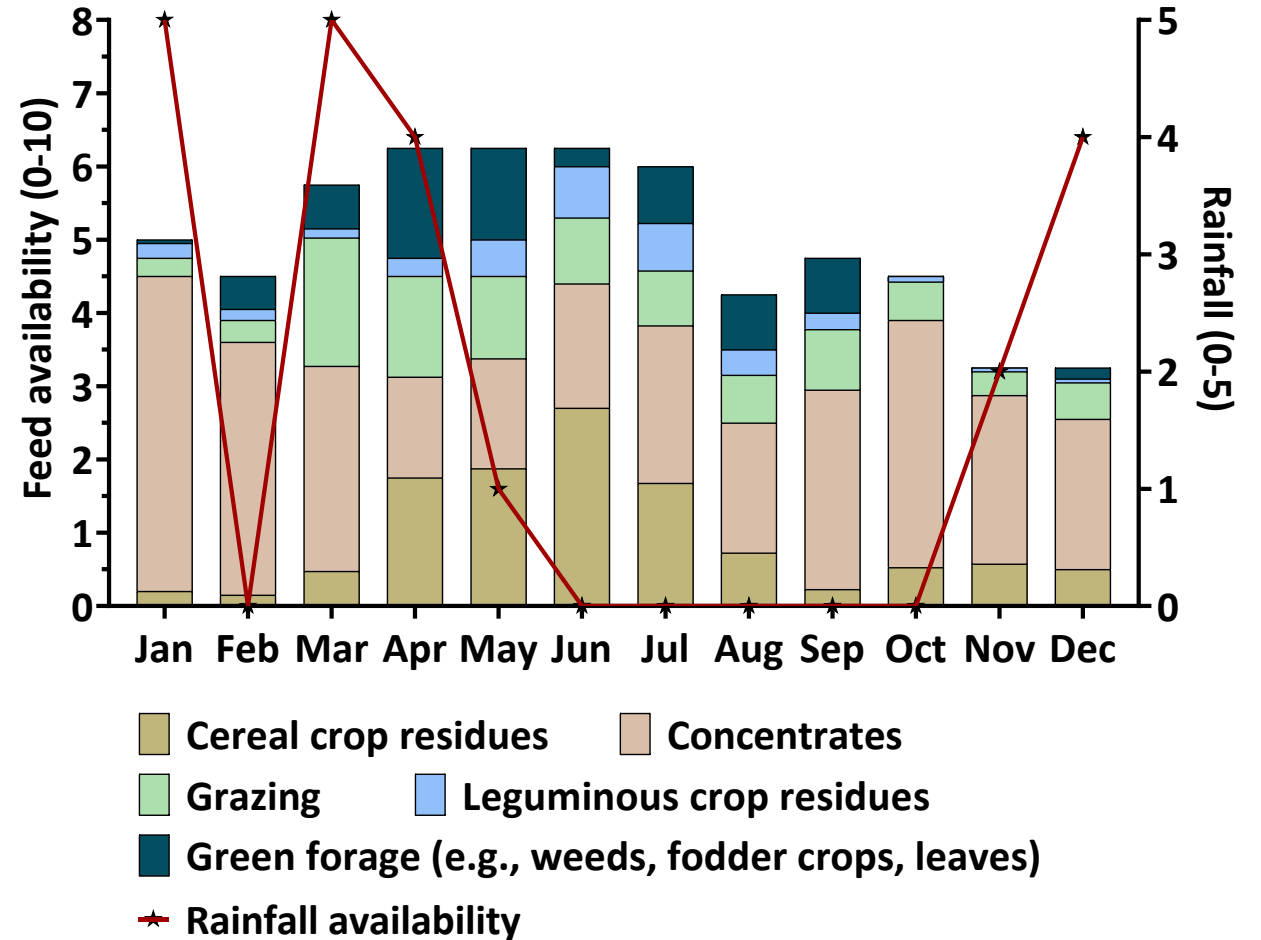
Takeaways and conclusions

Outline



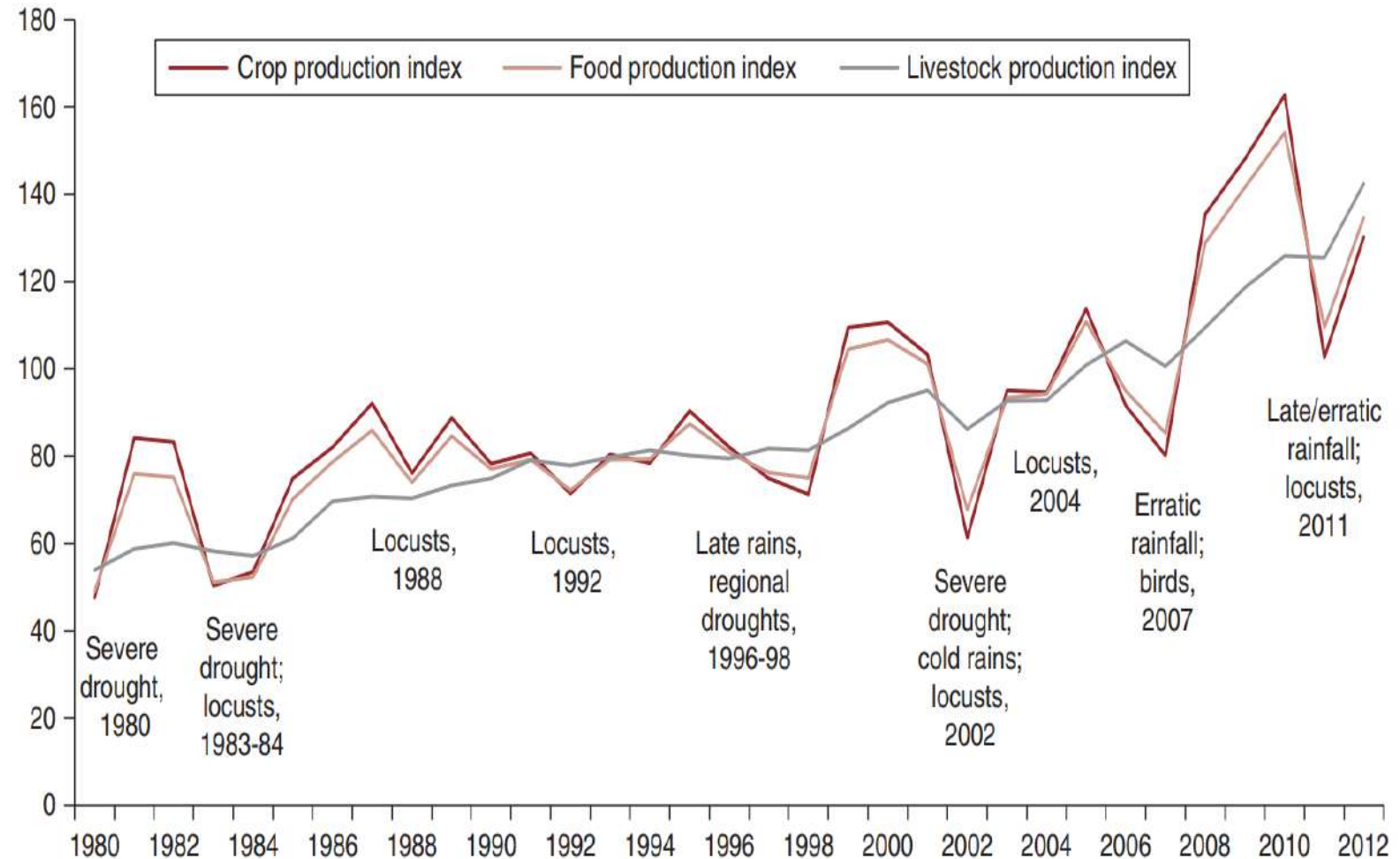
Role of crop residues in livestock feeds

- Crop residues provide **30 to 90%** of livestock feed.
- The dependence on crop residues is higher, especially in **dry periods**
- Livestock productivity is proportionately impacted by the availability of feeds

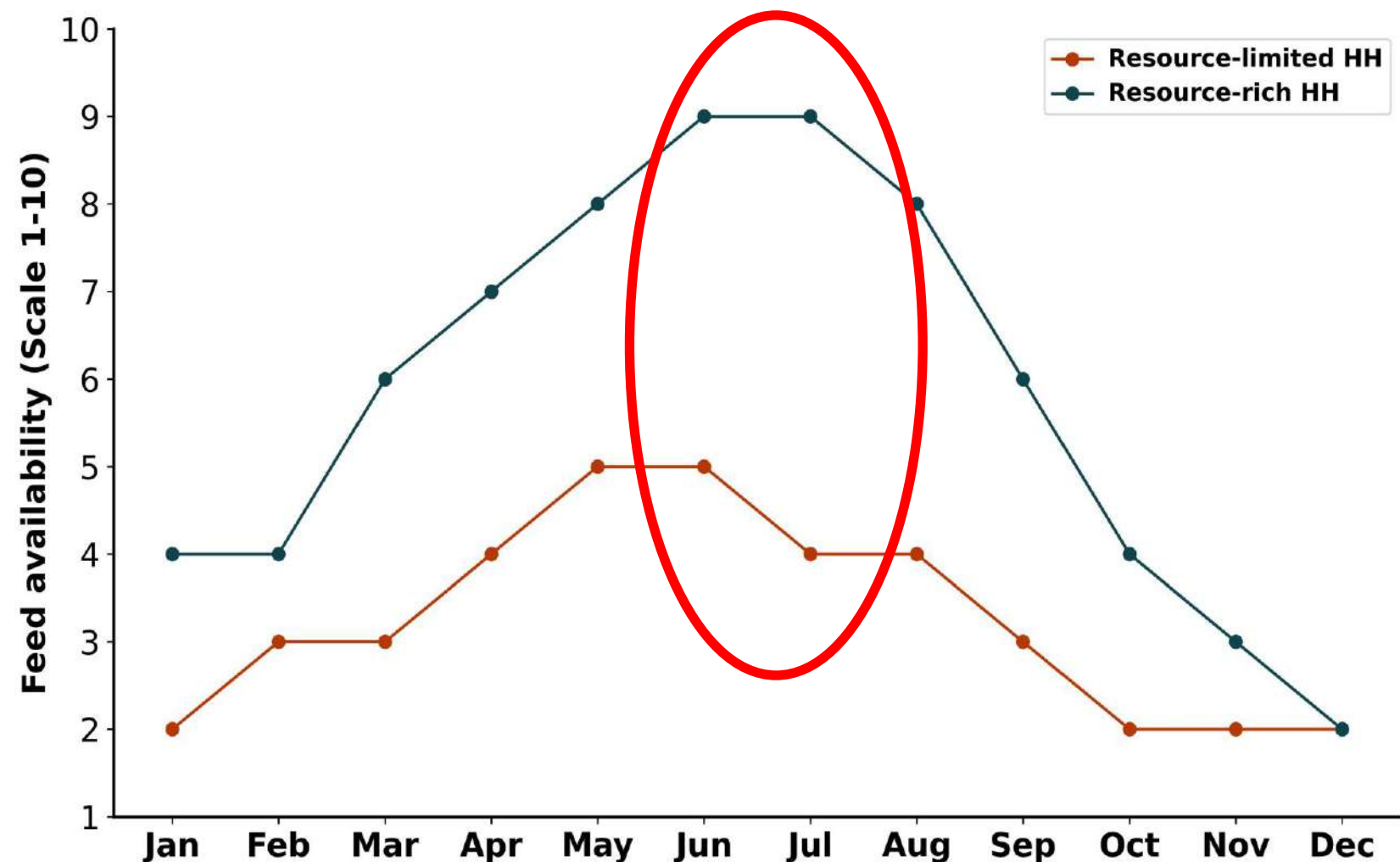


Climate risks in agriculture

- Climate risks significantly constrain agricultural productivity
- **Droughts** → affect productivity, food security, and economic stability.
- **Floods** → damaging infrastructure and displacing communities



Climate risk management efforts: Challenges



**Lack of Farmer-Centric
Climate-informed Agro-
advisory tools**

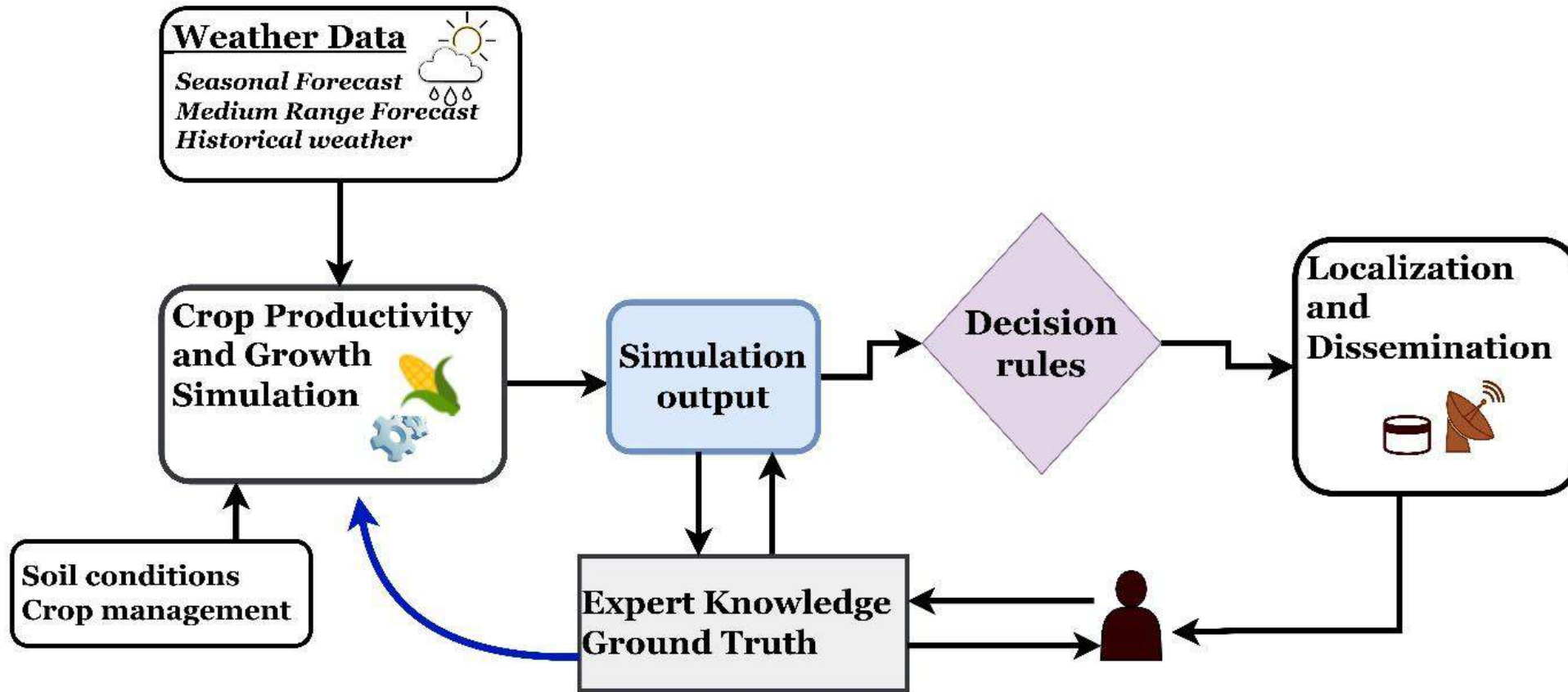


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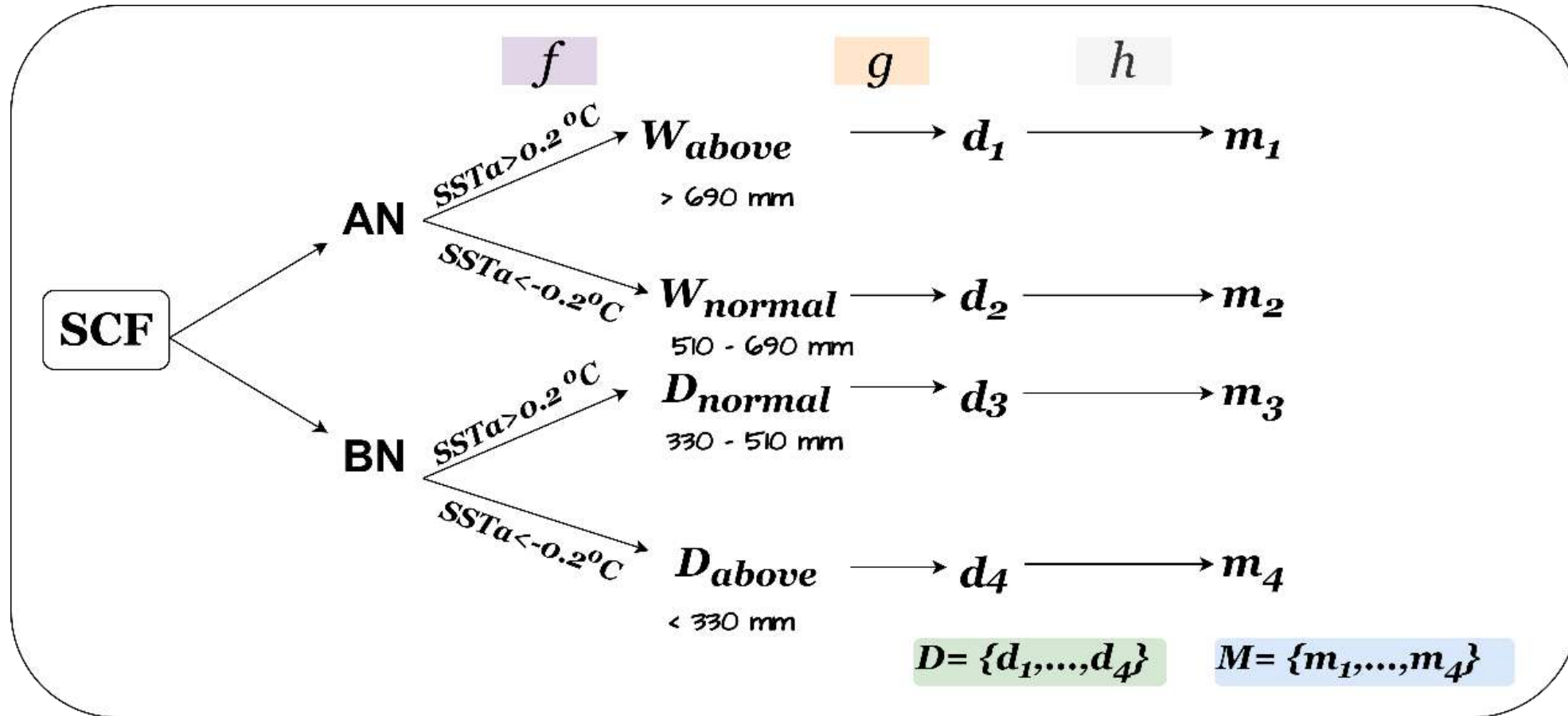
Decision support tool for **climate risk management**

- Developed and implemented the intelligent Agricultural System Advisory Tool (iSAT)
 - **co-designing** → farmers and experts → crop and location-specific, climate-informed agro-advisories
- Evaluate the effectiveness of iSAT in supporting smallholder farmers' decision-making
 - **Pre-season planning and in-season management**
- Assess the **impact of iSAT** advisories on farm productivity, profitability, and resource management

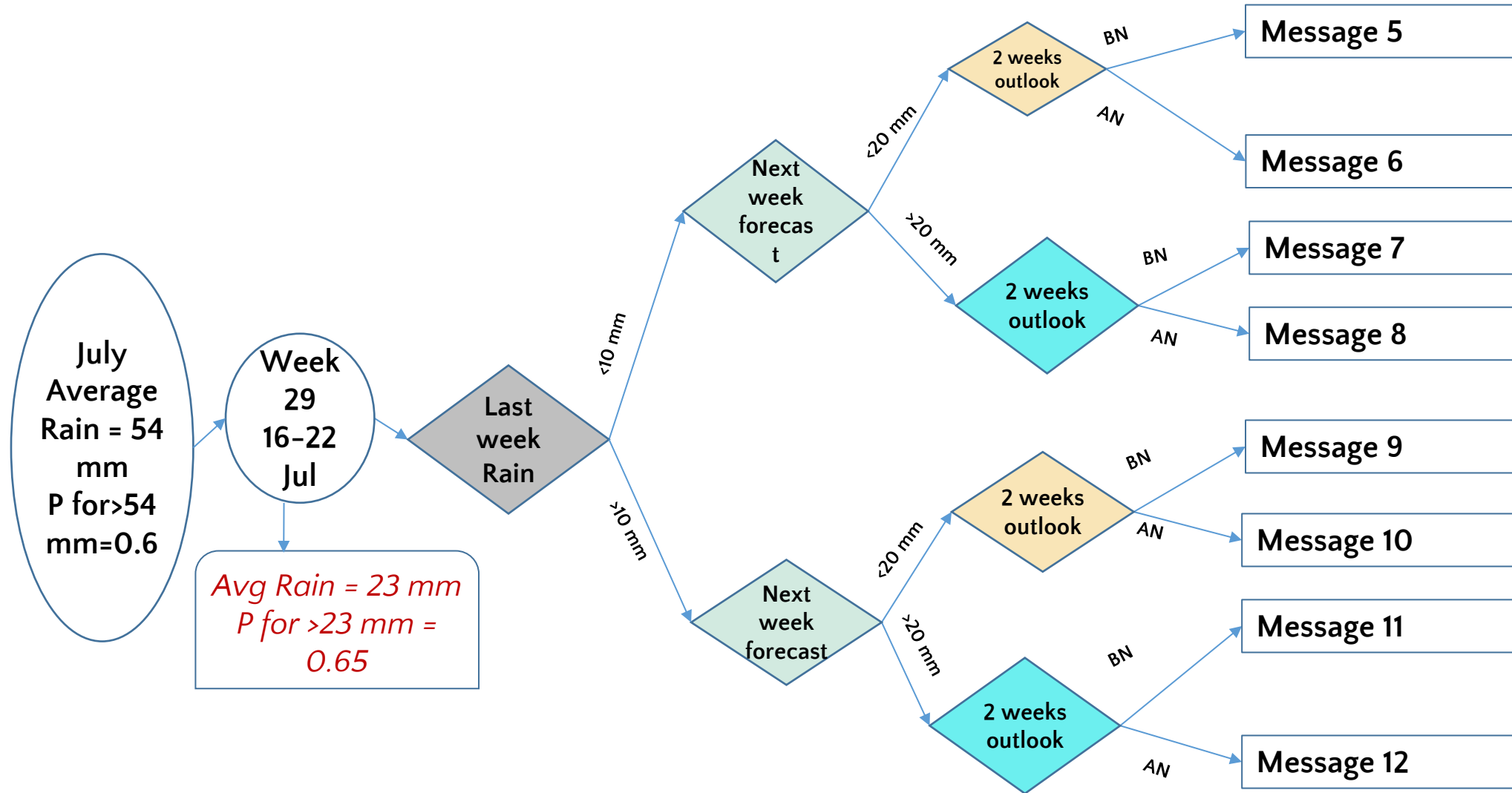
The iSAT framework



Pre-season Decision Tree

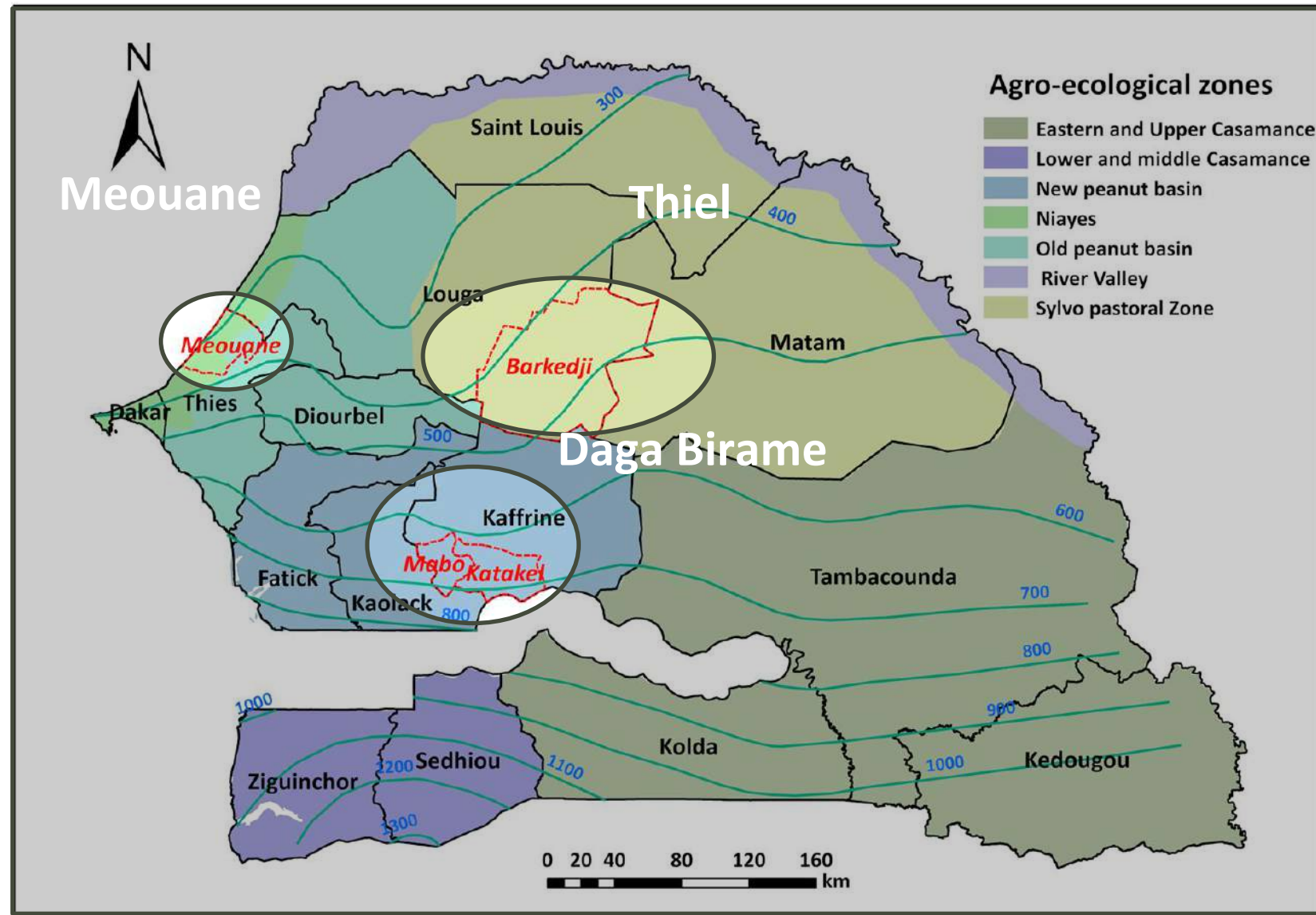


In-season Decision Tree



Implementation: Senegal

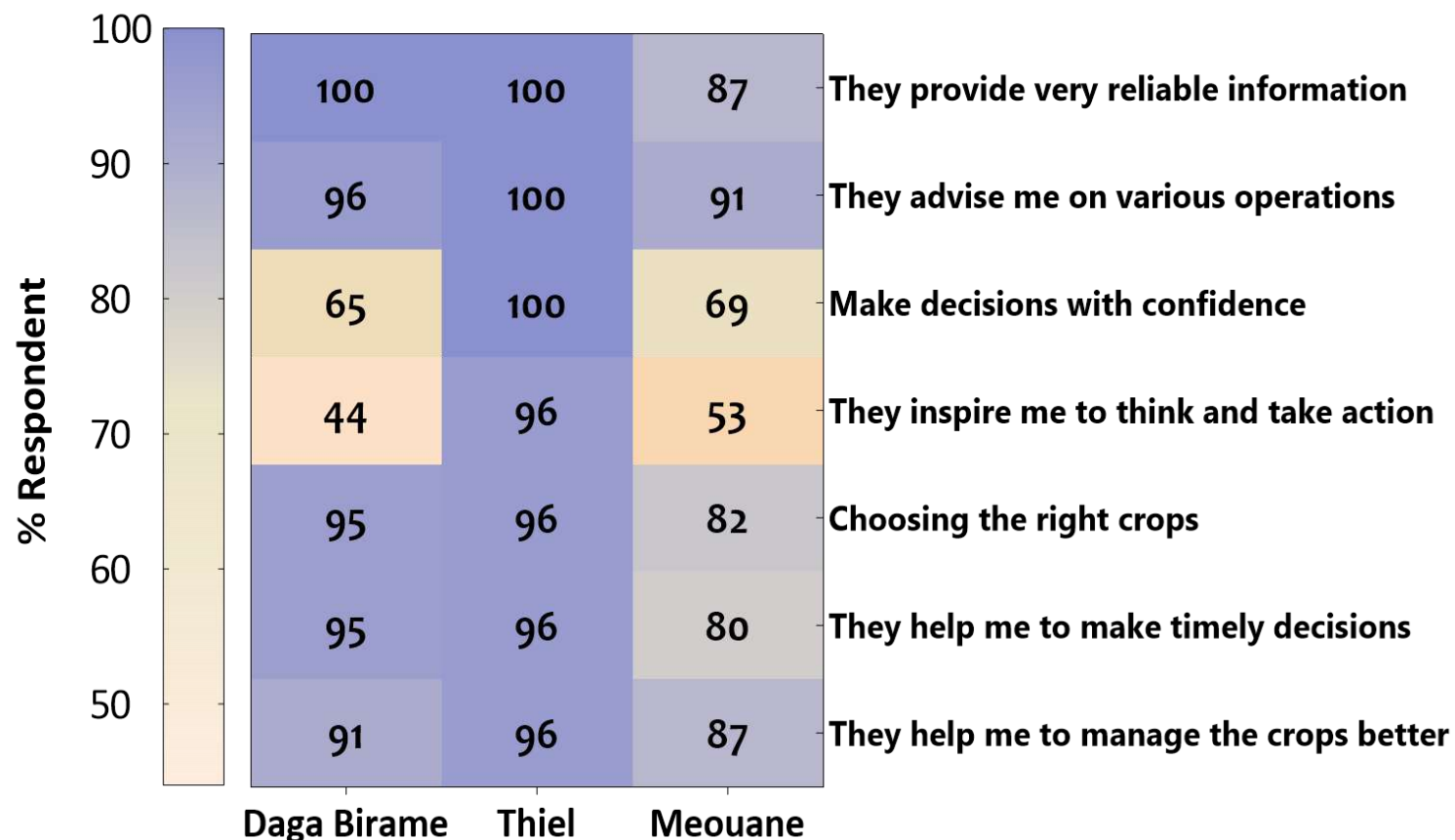
- Over 2700 farmers directly reached in 2022 - 2023
- Advisories were localized → IVR → Jokalante.
- **Feedback from farmers** collected



Key Results

- **80%** of users (n=2720) positively rated the tool as useful in various aspects
- Users found a **24%** reduction in input and labor costs per hectare

Farmers' ratings



Key Results

- **41%** Pearl millet yield increase
- **21%** Groundnut yield increase
- No significant difference was observed in cowpeas

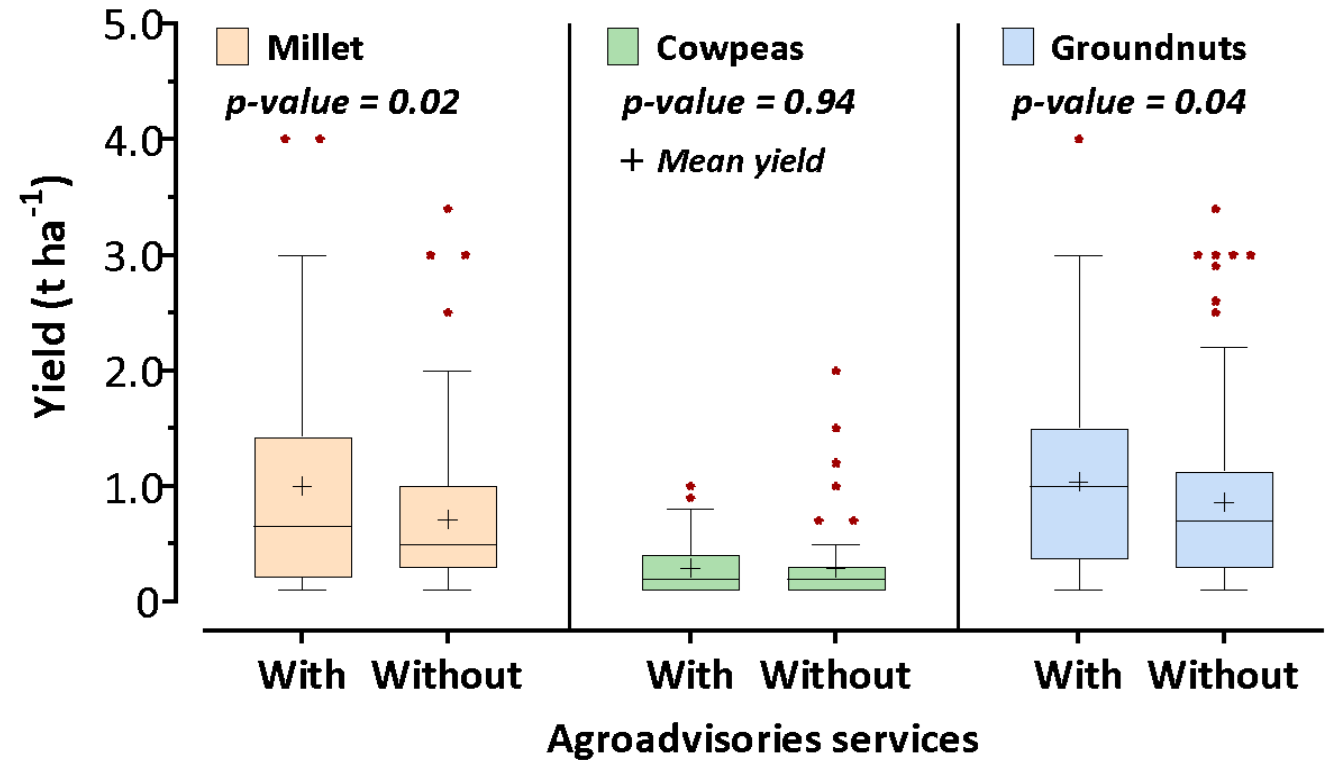


Figure: Comparative distribution of crop yields for farmers with and without access to iSAT.

Key Takeaways

- Participatory co-learning strengthens advisory uptake, reducing climate risk for smallholder farmers in crop-livestock systems
- Farmer-centric agro-advisory tools like iSAT can
 - significantly enhance climate-informed decision-making,
 - boosting productivity, enhancing feed availability, and reducing input costs.
- The private sector, like Jokalante in Senegal, plays a key role in scaling CIS for climate-resilient agriculture.

Conclusion and recommendations

- Manage climate risk with farmer-centric tools, i.e., **iSAT**
 - Boosting production and residues
- Balancing trade-offs
 - soil nutrient depletion and methane emissions
- Future directions
 - Empower farmers to produce high-quality residues, improve digestibility, and reduce emissions



Acknowledgements





Thanks for listening

References

1. <https://cgspace.cgiar.org/items/032fc5bb-0c73-427b-b1cd-fc4e8bca1b7f>
2. <https://aiccra.cgiar.org/publications/isat-newgeneration-digital-agro-advisory-tool-empowers-farmers-manage-climate-risks>
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4. Ramaraj, A., Rao, K., Kumar, G. K., Ugalechumi, K., Sujatha, P., Rao, S. A., Dhulipala, R., & Whitbread, A. (2023). Delivering context specific, climate informed agro-advisories at scale: A case study of iSAT, an ICT linked platform piloted with rainfed groundnut farmers in a semi-arid environment. Climate Services, 31, 100403. <https://doi.org/10.1016/j.cliser.2023.100403>
5. <https://cgspace.cgiar.org/items/ee14181a-49a3-45a1-b994-25380fcff130>