



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



State of the evidence and research gaps in agricultural insurance and climate risk

Berber Kramer, International Food Policy Research Institute (IFPRI)

International Microinsurance Conference
Lusaka, November 6 2018

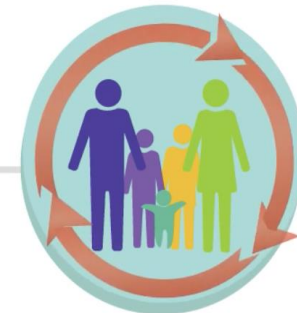


Impacts of weather shocks on livelihoods

LESS VULNERABLE



POVERTY CYCLE



LOWER INCOME

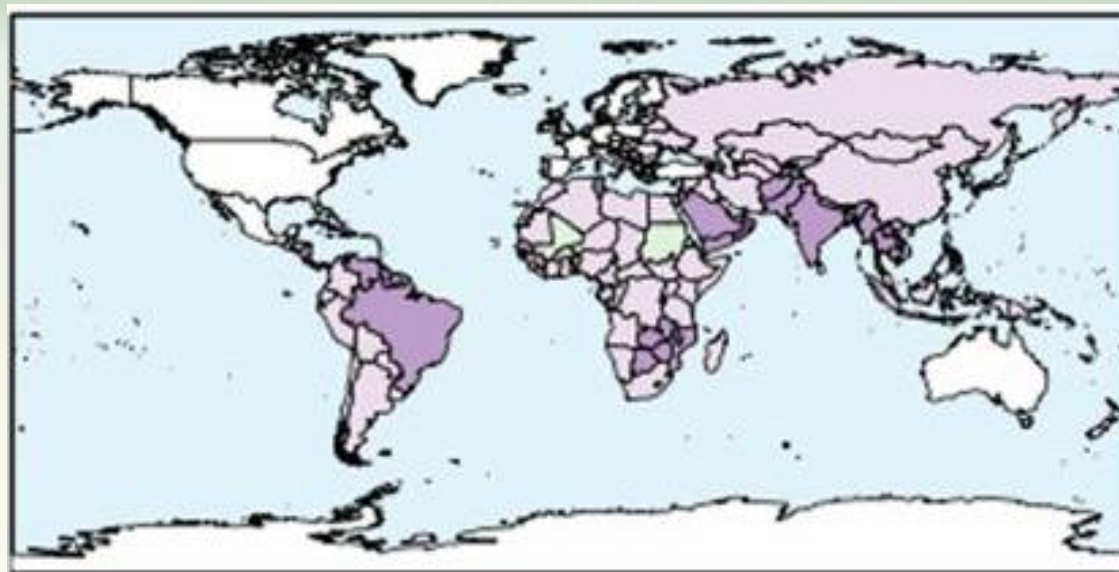
Global warming: Worsening vulnerability to food insecurity



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



Change in Hunger and Climate Vulnerability Index at 2°C global warming



Source: Betts *et al.* (Phil. Trans. R. Soc. A, 2018).

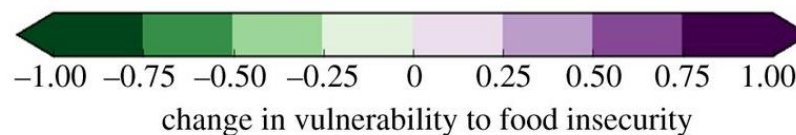
ISSN 1364-503X | Volume 376 | Issue 2119 | 13 May 2018

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A

MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES

The Paris Agreement: understanding the physical and social challenges for a warming world of 1.5°C above pre-industrial levels

Theme issue compiled and edited by Dann Mitchell, Myles R Allen, Jim W Hall, Benito Mueller, Lavanya Rajamani and Corinne Le Quéré



Agricultural insurance

Traditional indemnity-based insurance:

- High administrative and transaction costs.
- Asymmetric information between insured and insurer, which in turn gives rise to adverse selection and moral hazard.

Index-based insurance to overcome these challenges:

- Trials on weather index insurance show that index insurance **can** lead to higher investments in risky cash crops
- Weather index-based insurance in Ghana (Karlan *et al.*, 2014) and India (Cole *et al.*, 2014; Mobarak and Rosenzweig, 2014)
- Livestock insurance using remotely sensed vegetation index: Kenya & Ethiopia (Jensen, Barrett and Mude, 2015)
- Hybrid index product in Bangladesh (Vargas Hill *et al.*, 2019)



Yet, low demand even at low premiums



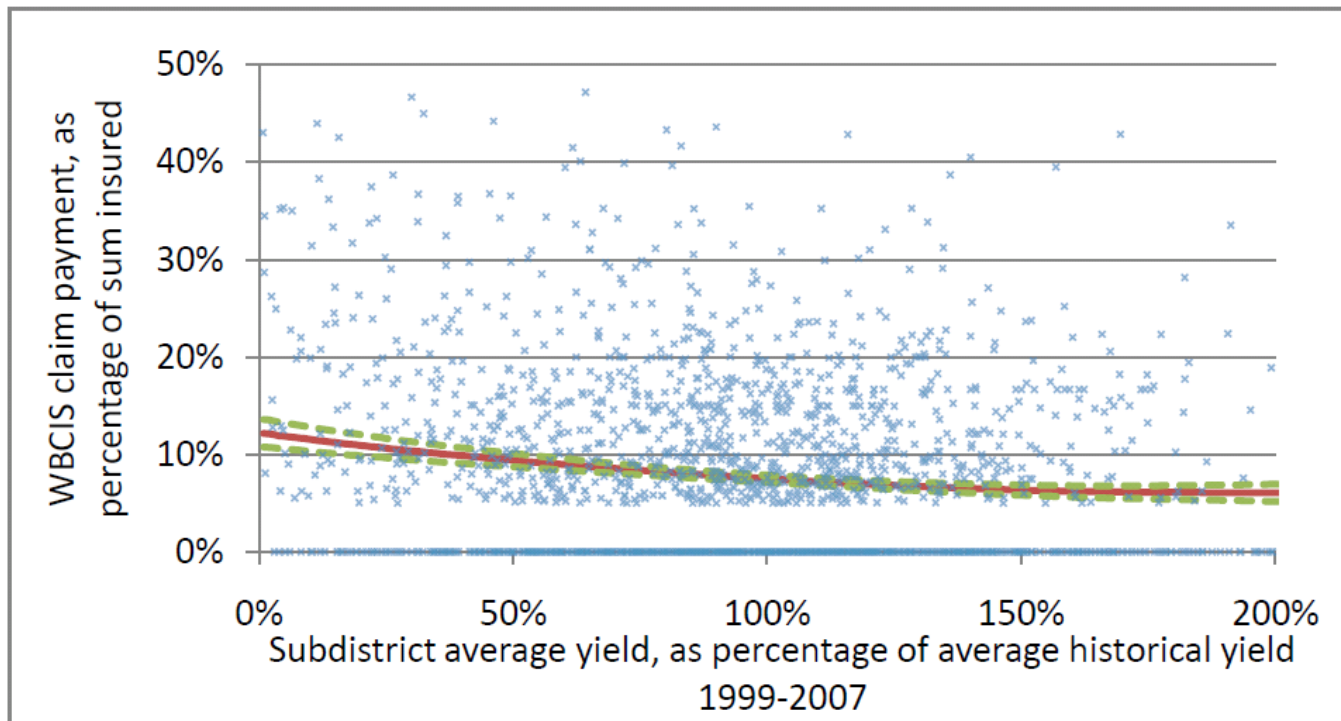
RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



De Bock and Galade, 2012 (review); Cole et al., 2013; Mobarak and Rosenzweig 2014 (India); Karlan et al., 2014 (Ghana). Adapted from IPA.

Major challenge: Basis Risk

Weather based crop insurance payouts against yields in India



Note: The lines show the point estimate and 95% confidence intervals for an Epanechnikov kernel with a bandwidth of 0.8.

Source: Clarke, Mahul, Rao and Verma (2012). World Bank Policy Research Working Paper 5985

Innovations to reduce basis risk



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



Three innovations in presentation today:

- Fail-safe contract design with audits (design risk)
- Ground pictures to reduce information asymmetries (spatial risk)
- Crop models for smarter index design (temporal risk)

Thursday session “Research for scaling agri insurance”

- Crowdsourcing to collect additional ground data
- Bundling insurance with stress-tolerant seed varieties
- Impact evaluations of innovations in agricultural insurance



Fail-safe contract design with audits

Reducing basis risk: Allowing farmers to request audits when index fails (Berhane *et al.*, 2015; Flatnes & Carter, 2016; Vargas Hill *et al.*, 2019)

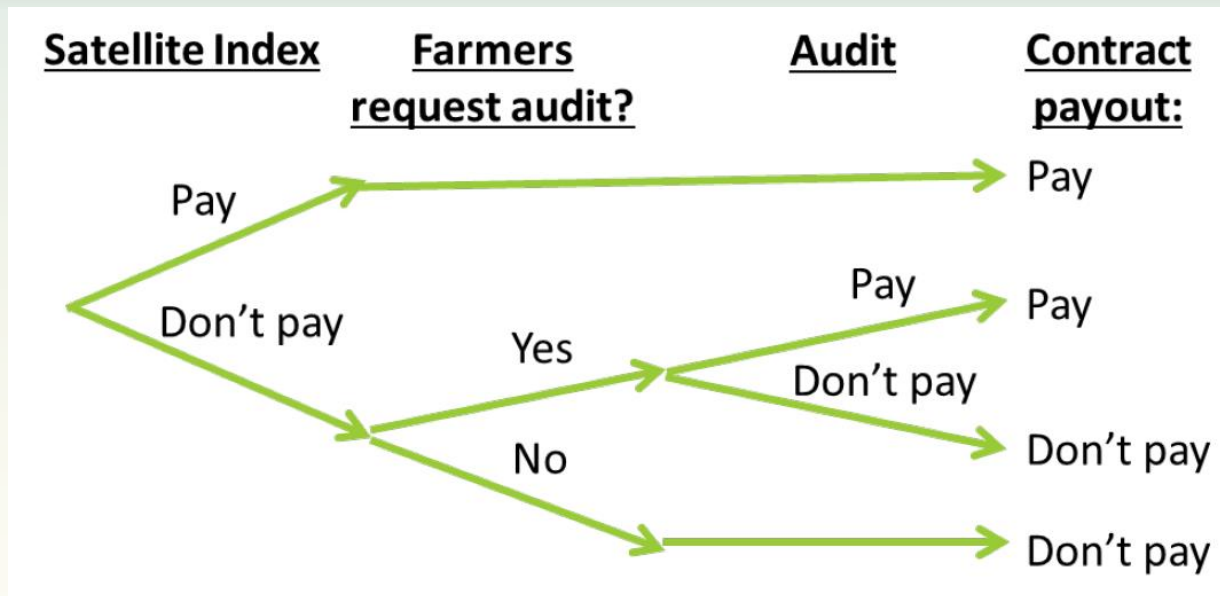


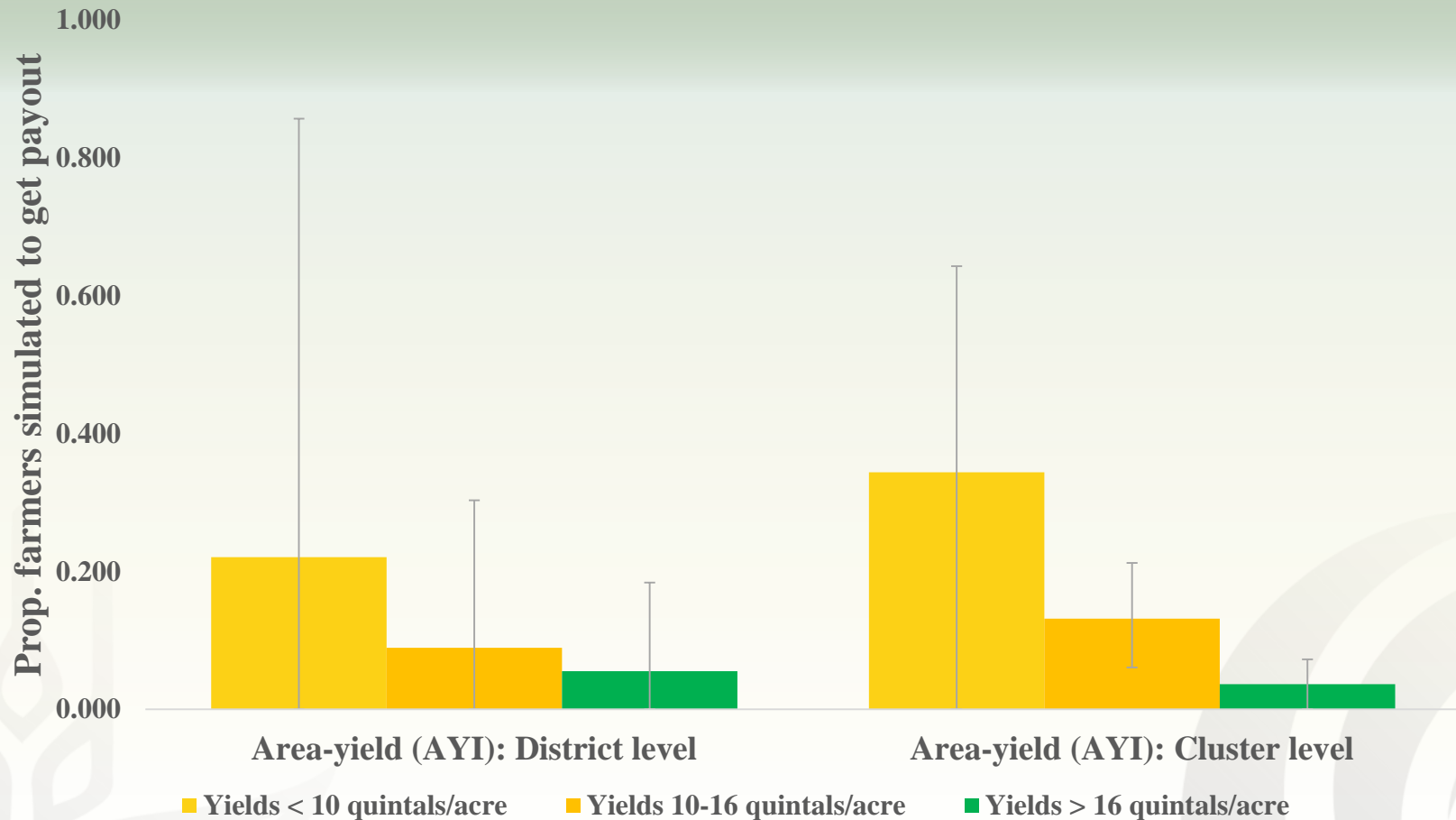
Figure adapted from Flatnes, Carter and Mercovich (2018), presented at ICAE 2018

Challenges:

- Cost of conditional audit and risk of delays
- Limited farmer engagement and participation
- Idiosyncratic risks that don't affect an area at large

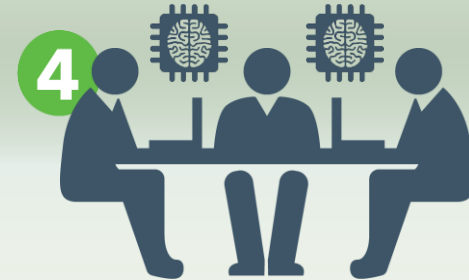
Basis Risk in Area Yield Insurance

Simulated area-yield based payouts against yield categories



Source: Crop cutting experiments data for 50 villages in Haryana and Punjab (Ceballos, Kramer and Robles, 2018).

Picture-Based Insurance (PBI)

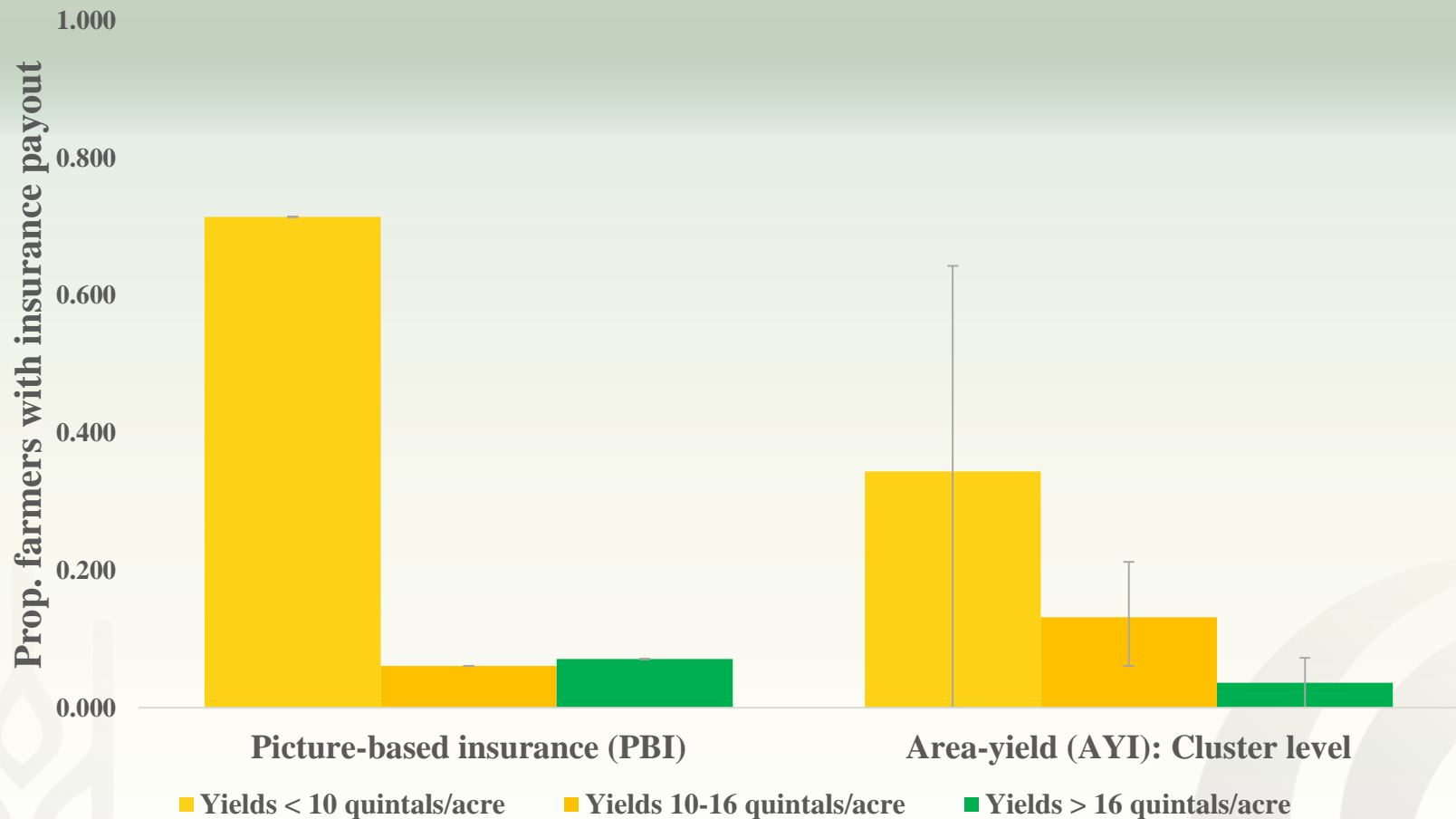


5

Degree of damage	0-19% (none/mild)	20-49% (moderate)	50-74% (severe)	75-100% (extreme)
% of sum insured	0%	35%	65%	100%



Experiment on PBI in northwest India



Source: Crop cutting experiments data for 50 villages in Haryana and Punjab (Ceballos, Kramer and Robles, 2018).

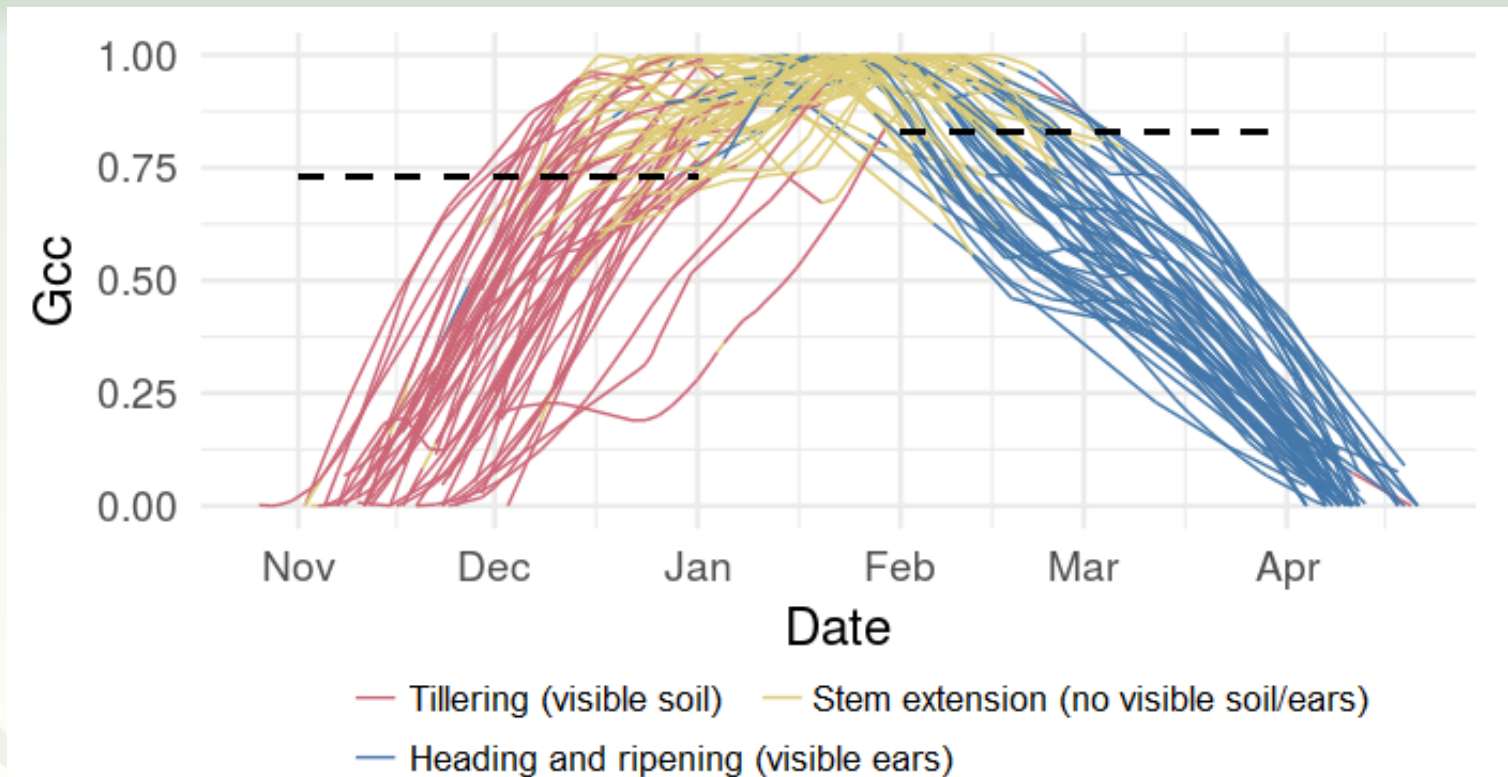
Crop models for smarter index design



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



Feed observed growth stage and other agronomic information into crop models to predict weather-related production losses



Note: 'Gcc' stands for green chromatic coordinate, with its value normalized by the maximum gcc for the site. See details in Hufkens et al. (2018)

Research gaps for such innovations



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



- Implications for **service quality** and **consumer demand**?
 - What are the estimated impacts (investments, income and assets, but also consumption, consumption smoothing, and ultimately welfare)?
- To what extent does use of technology affect **gender inclusivity**?
- Does technology give rise to new **distribution channels**?
 - New form of insurance to be offered by telecoms?
 - Bundling with digital credit and savings, mobile money?
- **Broader risk management**—how to avoid crowding out of risk prevention and climate adaptation / CSA?
 - Technology reduces information asymmetries: climate-smart subsidies?
 - Unlock credit required to invest in CSA practices and technologies?

Thank you!

Questions & Answers

