

Improving Rice Production Through Digital Technology: Validating the RiceAdvice Decision Support Tool in Mali



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Introduction

- Blanket fertilizer rates and conventional fertilizer management have often failed to improve yield and economic gains for smallholder rice farmers in Mali.
- Providing personalized fertilizer rates and management recommendations with a decision support tool (DST) holds promise for productivity and economic improvements in rice farming.
- The RiceAdvice Lite (RAL) is a digital mobile DST developed by the AfricaRice.
- It provides personalized site-specific fertilizer rates and management recommendations for rice farmers.

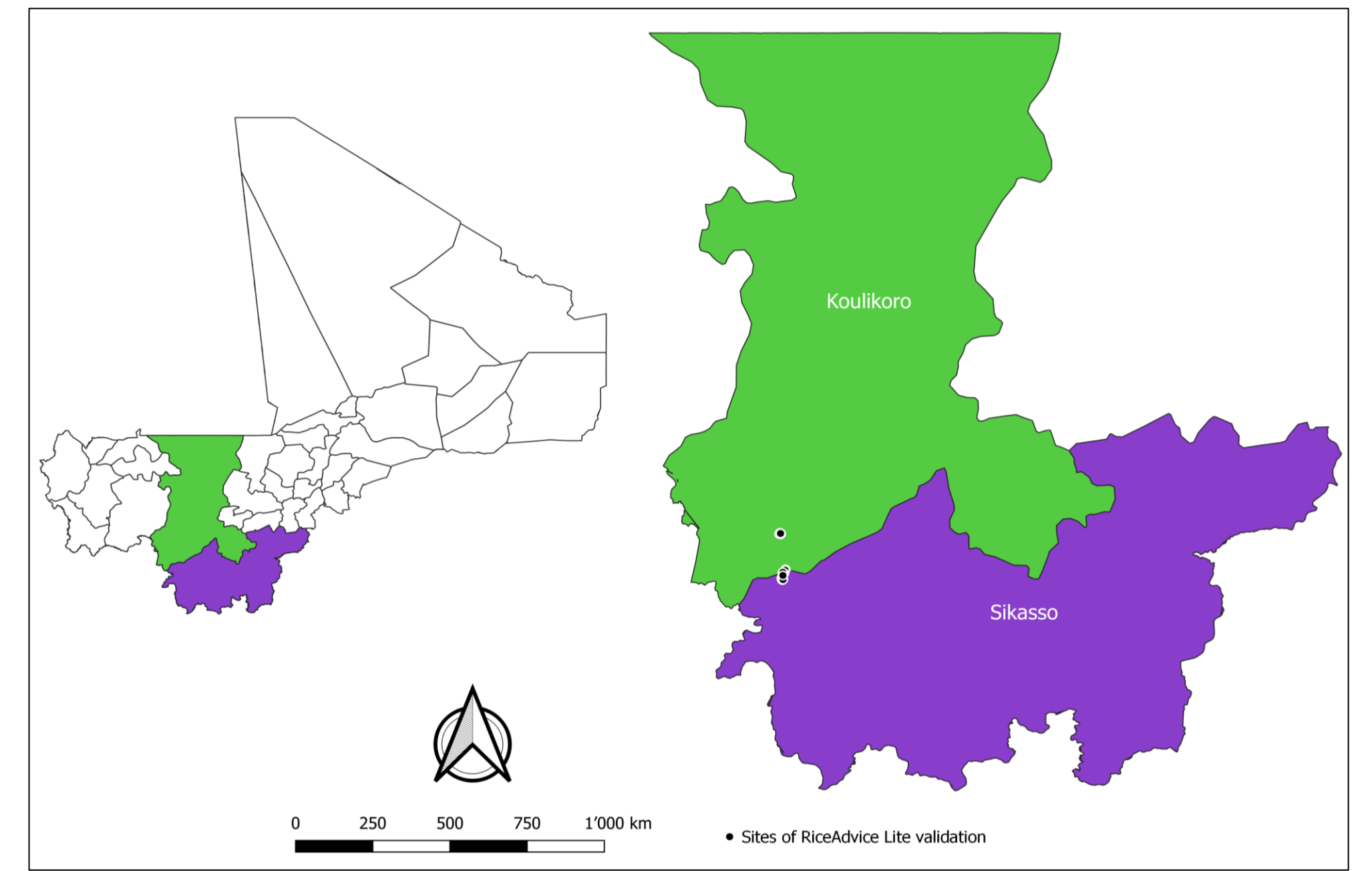


Fig. 1: Map showing sites of RiceAdvice Lite validation in 17 villages across Koulikoro and Sikasso in Soudan-Guinea agroecology, Mali. Thick black dots on the map represent field locations. The dots overlap in most cases because of field proximity.

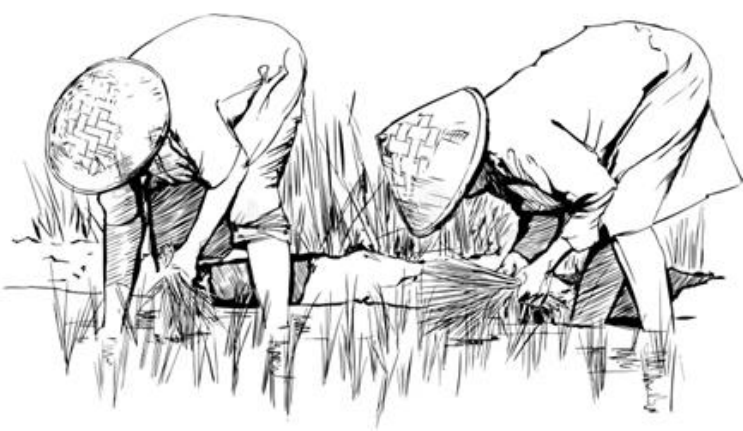
Methods

- Forty-seven (47) non-replicated on-farm trials were conducted to validate the RAL in 17 villages across Koulikoro and Sikasso in the **Soudan-Guinea agroecology in Mali** in 2023 (**Fig. 1**).
- The RAL fertilizer rate and management recommendations were compared with conventional farmers' rates and management practices (CFP).
- Rice transplanting was done the same day for both treatments per site.
- Observations included paddy yield (at 14% moisture content), nitrogen (N) use-efficiency, and benefit-cost ratios (BCR) with and without government fertilizer subsidy.

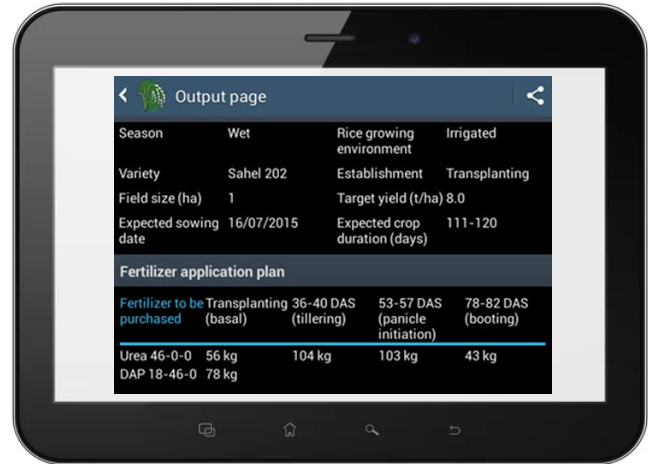
Using RiceAdvice



Step 1: Download the RiceAdvice from Google Play on a smartphone or tablet.



Step 2: Fill in farmers' rice growing conditions, sowing date, rice variety, practices, fertilizer availability, and field area.



Step 3: Get personalized advice including a crop calendar, fertilizer plan, and other good management practices.

Results

Table 1: Mean fertilizer rate and management recommendations of the RiceAdvice Lite and conventional Farmers' practices.

RiceAdvice Lite:	Basal/ initial application	First top-dressing	Second top-dressing	Third top-dressing	Average total N (kg/ha)
Fert. type & rate (mean):	NPK 17:17:17 (224.1 kg/ha.)	Urea (81.0 kg/ha)	Urea (108.0 kg/ha).	Urea (18.7 kg/ha).	
Average applied N:	38.0 kg N/ha.	37.2 kg N/ha.	49.6 kg N/ha.	8.6 kg N/ha.	133.6 kg N/ha
Application schedule:	1.0 days after transplanting (DAT)	21.2 DAT	40.1 DAT.	43.3 DAT.	
Percentage of farms:	100%.	100%	100%.	19.1%.	
Farmers' Practice:					
Fert. type & rate (mean):	NPK 17:17:17 (207.3 kg/ha.)	Urea (176.5 kg/ha)	Urea (33.4 kg/ha.).	None.	
Average applied N:	35.2 kg N/ha.	81.1 kg N/ha.	15.4 kg N/ha.	--	129.7 kg N/ha.
Application schedule:	13.3 DAT.	36.0 DAT.	50.7 DAT.	--	
Percentage of farms:	100%	100%	25.5%.	--	

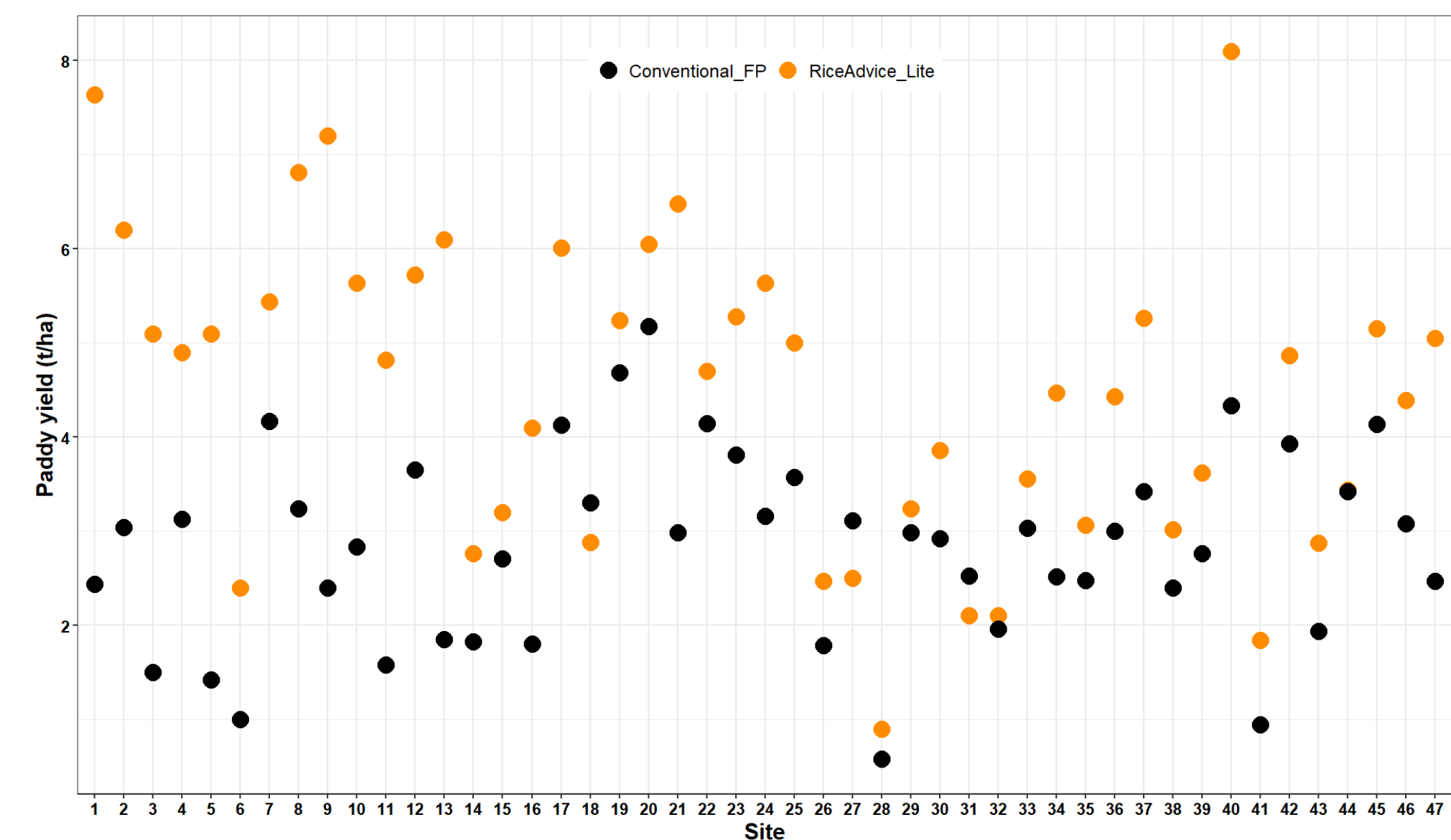


Fig. 2: Effects of the RiceAdvice Lite fertilizer rate and management recommendations versus conventional farmers' practices on paddy yields across 47 sites in Mali.

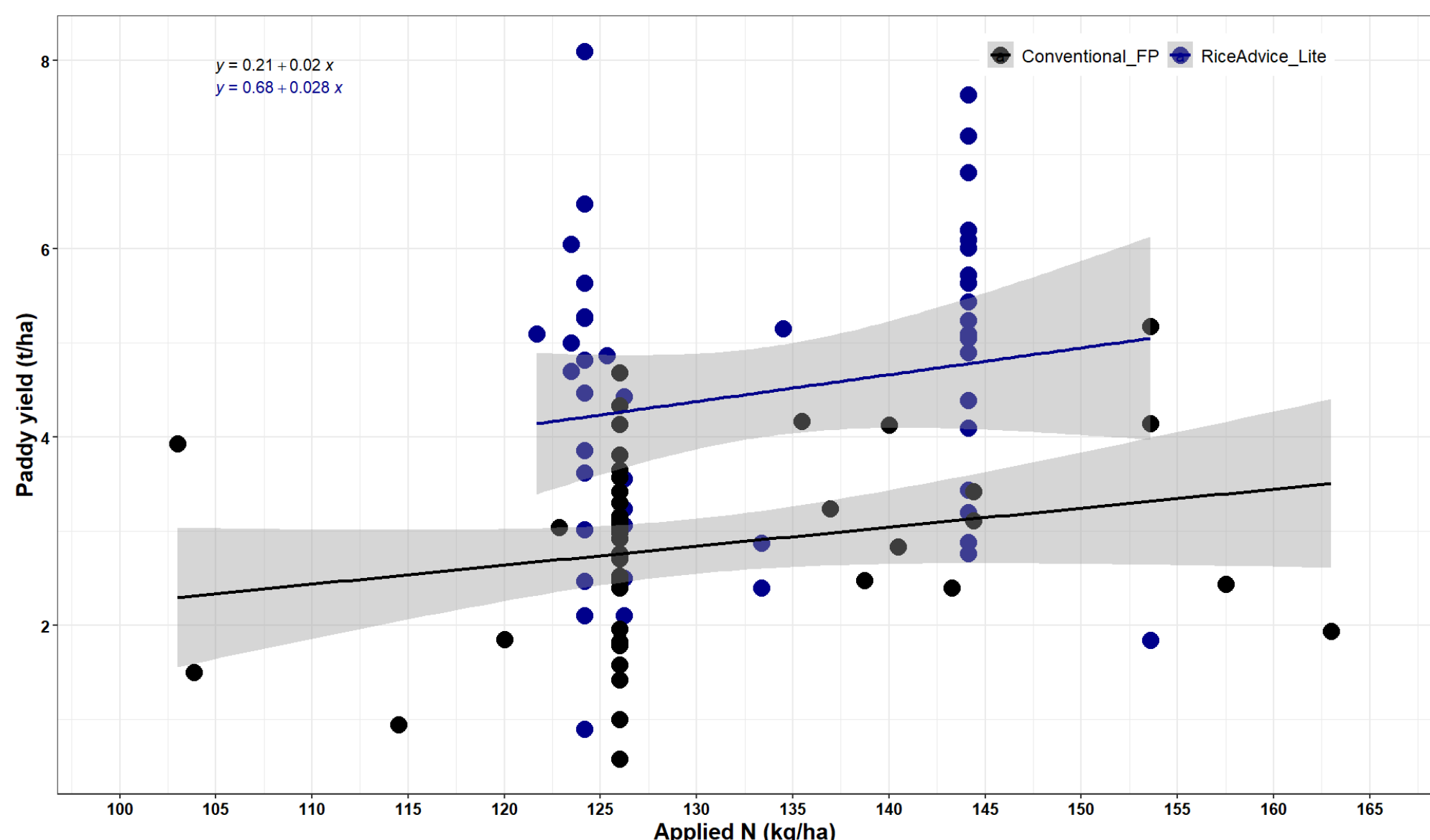


Fig. 3: Effects of the RiceAdvice Lite fertilizer rate and management recommendations versus conventional farmers' practice on paddy N use-efficiency in Mali.

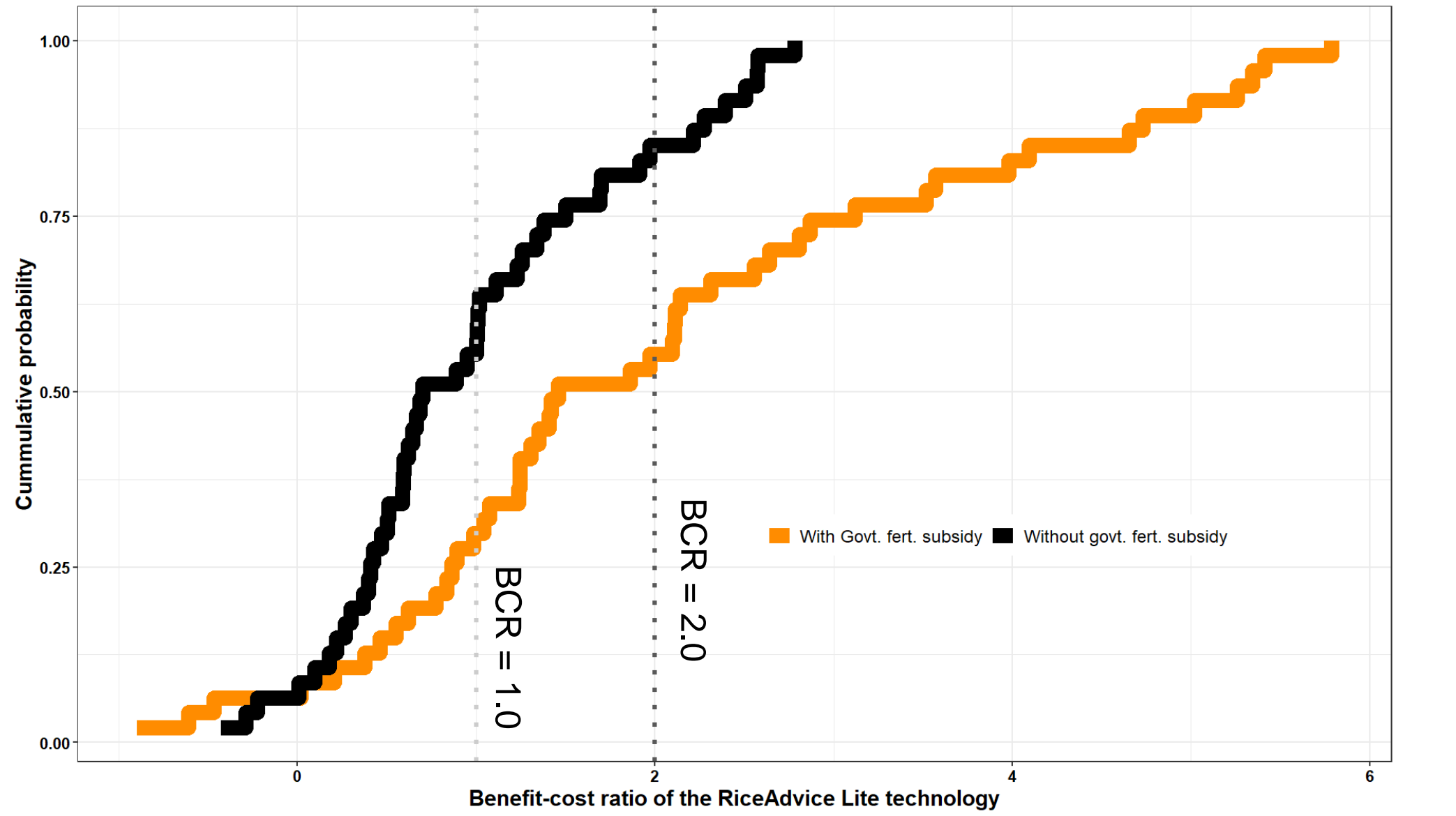


Fig. 4: Benefit-cost ratio of the RiceAdvice Lite technology over conventional farmers' practices with and without government fertilizer subsidy.

The RiceAdvice Lite fertilizer rates and management recommendations increased paddy yield by an average of 18% (1.5 t/ha) compared with CFP (**Fig. 2**).

Without increasing the quantity of fertilizer, the RAL technology resulted in higher N use-efficiency than the conventional farmers' practices (**Fig.3**).

A BCR ≥ 2.0 was obtained with the RiceAdvice Lite by 44.6% of farmers with government fertilizer subsidies compared with only 14.8% without subsidies (**Fig. 4**).

Conclusion

Extending the RiceAdvice Lite decision support tool services to rice farmers will improve rice productivity, N use-efficiency, economic profitability, and livelihoods without increasing the fertilizer used for rice production in Mali.