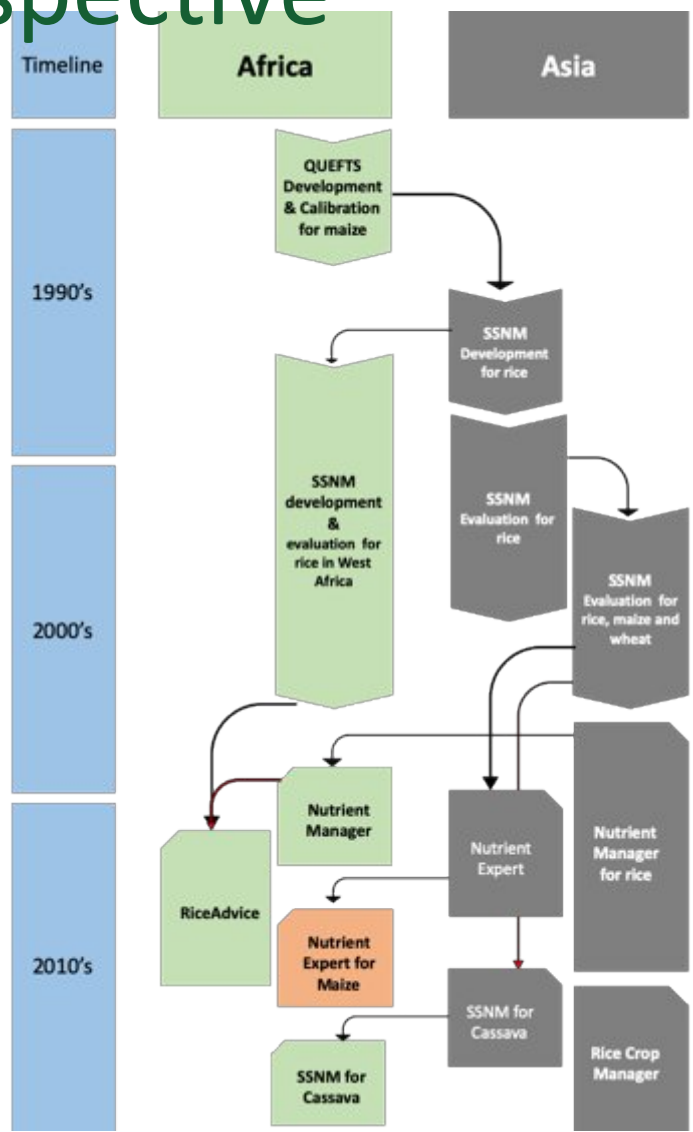# Feedback from experience in developing digital agriculture in Africa by Agricultural Service Provider Companies

Pauline Chivenge and Hakim Boulal

Spatial variability in smallholder farming systems

Site Specific Nutrient Management – Historical perspective

Chivenge et al. (FCR, 2022)

Nutrient Expert® for Wheat - Recommendation Sheet

Name and/or Location Site 1; Fès-Meknès; Fes; Morocco

Field size 1 ha **Wheat crop** bread wheat

Current yield 4 ton (13.5% MC) 4 t/ha (13.5% MC)

Growing environment Favorable rainfed

Recommended alternative practice for wheat

Yield goal 5 ton (13.5% MC) 5 t/ha (13.5% MC)

Seed rate 150-200

| | | | Sowing | Tillering | Jointing | Booting | Ripening |

Growth stage	DAS	Fertilizer sources	Amount (kg/ha)	N	P₂O₅ (kg/ha)	K₂O
Basal	0	Diammonium hydrogen phosphate (DAP)	97	17.46	44.62	0
		Ammonium sulfate (SA)	98	20.58	0	0
		Potassium chloride	90	0	0	54
Tillering	70-80	Ammonium nitrate	170	56.95	0	0

Recommendation for fertilizer placement:

1st application
If combined seed and fertilizer drill is available, apply granular fertilizer in band. Else, broadcast and incorporate. For powder fertilizer, broadcast and incorporate.

2nd/3rd application
Broadcast fertilizer manually or by using a fertilizer spreader.

**Other sources of nutrients**

Crop residue (Beans): low

PC version: http://software.ipni.net/article/SFT-7325

Android version: http://software.ipni.net/article/SFT-7322

Validation on-farm trials for NE of wheat in Morocco

Region	Province	(n)*	Yield (t/ha)			Gross Profit (USD/ha)		
			FFP	NE	NE-FFP	FFP	NE	NE -FFP
Abda	Safi	10	4.54	5.28	+0.74	9343	10305	+96
Chaouia	Settat	5	2.45	3.75	+1.31	4278	6839	+256
	Berrechid	5	2.86	3.75	+0.88	5431	6825	+139
Fez	Sefrou	10	4.20	5.36	+1.16	8261	10230	+196
Tadla	Fquih bensaleh	10	6.86	7.89	+1.43	13468	15145	+167

Source: Boulal et al. (unpublished data)

*FFP data (from one cropping season) = 5-10 farmers per province

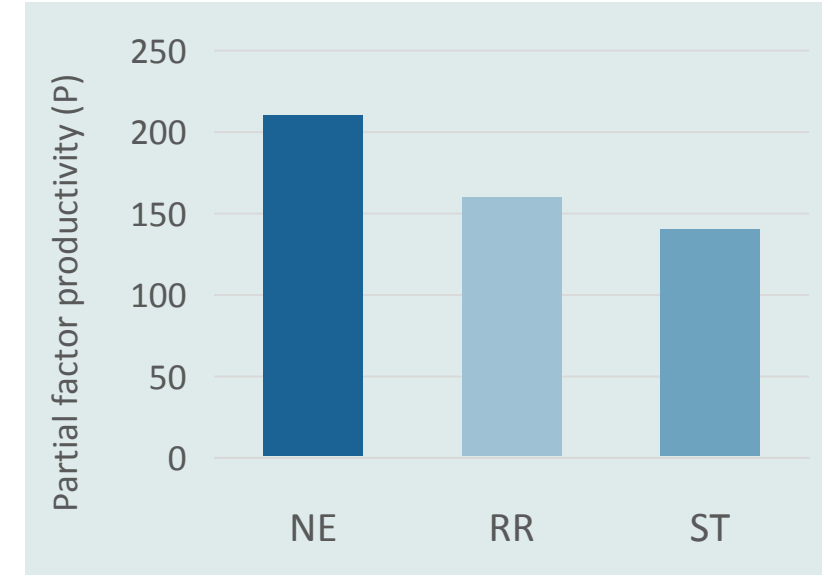# Triple-Wins with SSNM (NE) recommendations in Nigeria
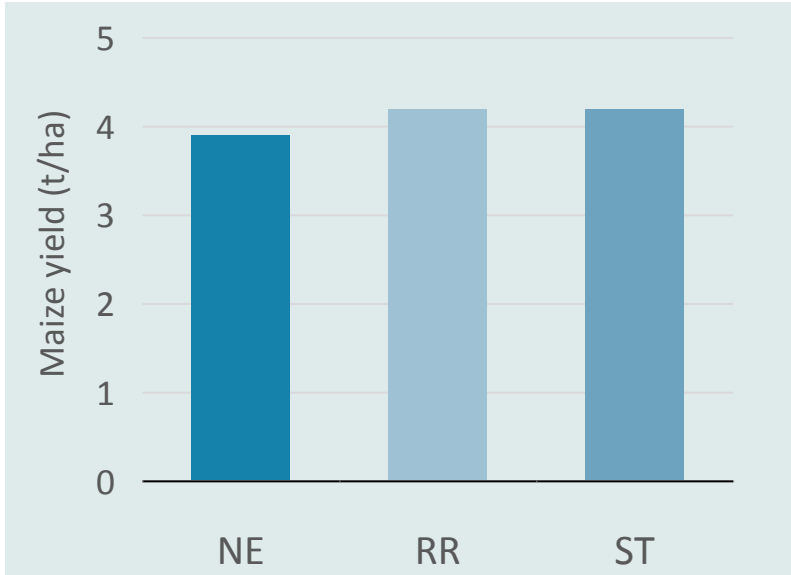
Double yields over farmer practice

Small yield penalty compared with RR and ST
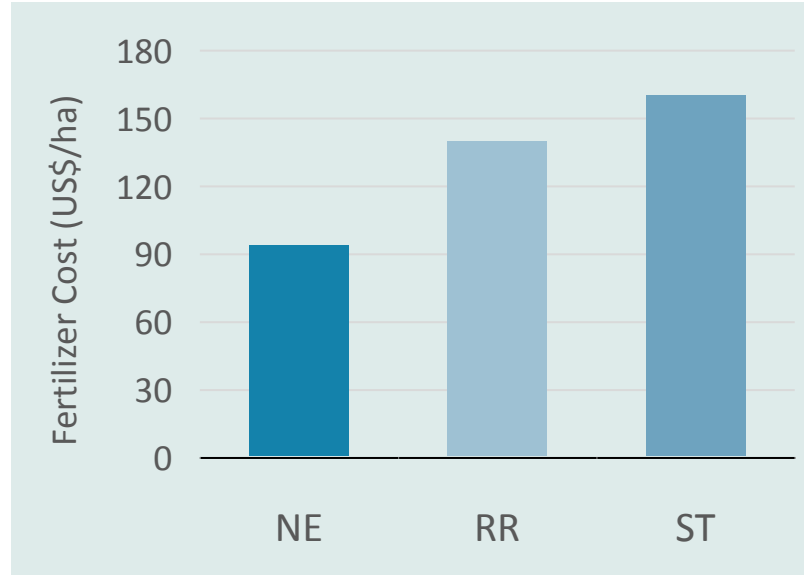
Reduced cost of fertilizer by >50%

Increased fertilizer use efficiency by >30%

Dissemination – Rice Crop Manager

Personal computer

Smartphone

AEW, agriculture technician:
- Downloads small app from internet,
- Interviews farmer,
- Submits information by internet to RCM on cloud-based server

RCM automatically:
- Generates recommendation printed by AEW and given to farmer
- Sends text messages to farmers

Printout before crop establishment

Text message reminders during the season

Each farmer's field gets a unique recommendation on nutrient and crop management

RCM Across Geographies

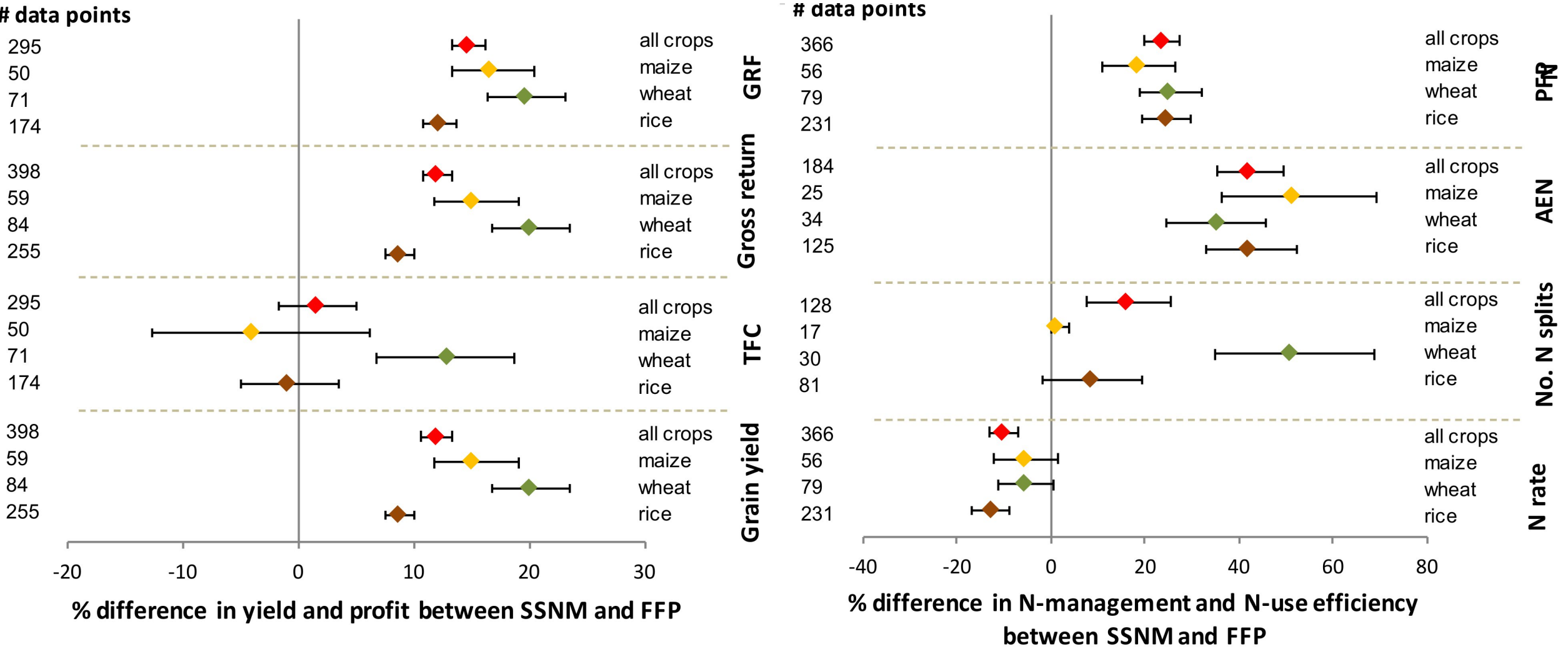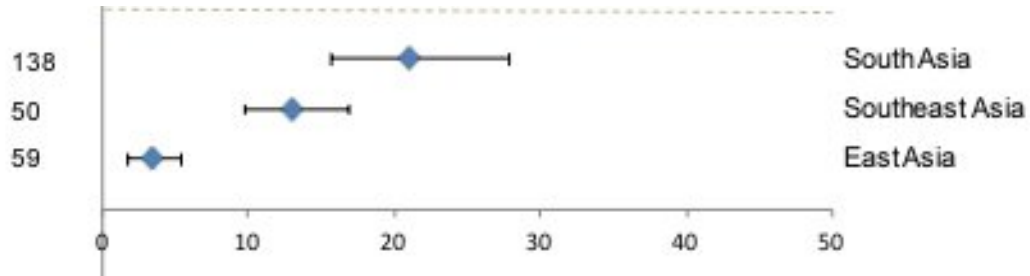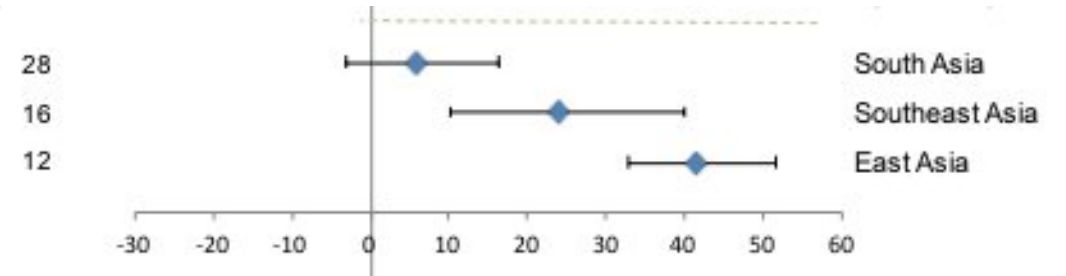|	2013-2018	2017-2018	2013-2014
# recommendations	+1.4 million	+70,000 (Orissa, Bihar, EUP)	+24,000
Increase in Yield	389kg/ha/season	545 kg/ha/season	363 kg/ha/season
Increase in income	USD106/ha/season	USD117/ha/season	USD67/ha/season

Co-benefits of SSNM: Meta analysis, 61 papers

Chivenge et al., 2021. GFS

Regional Responses

Maize / Rice / Wheat regional response charts showing % difference in grain yield between SSNM and FFP, and % difference in PFP N between SSNM and FFP.

Chivenge et al., 2021. GFS
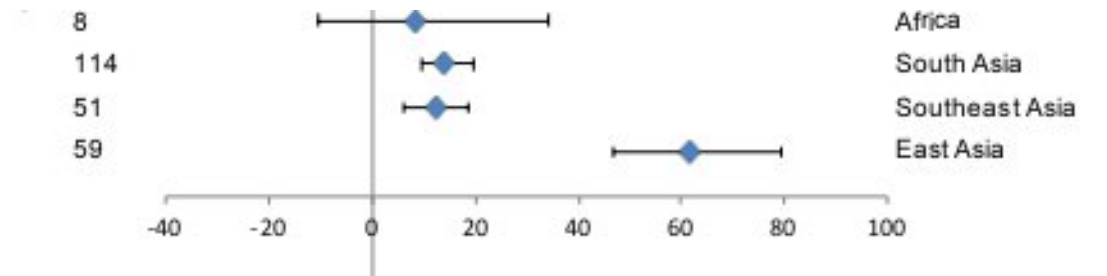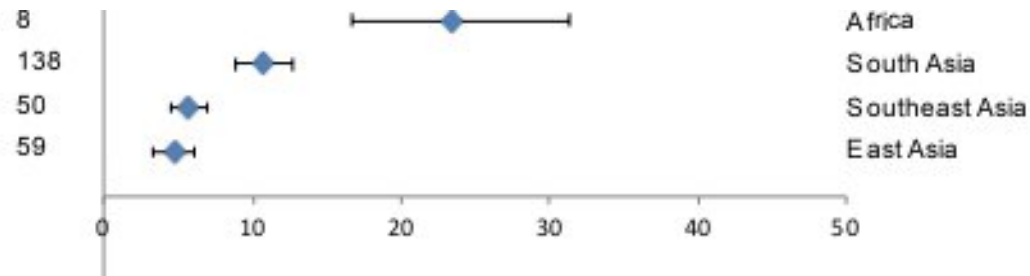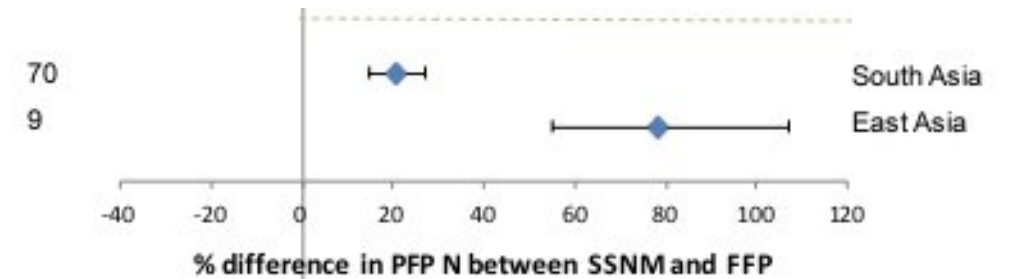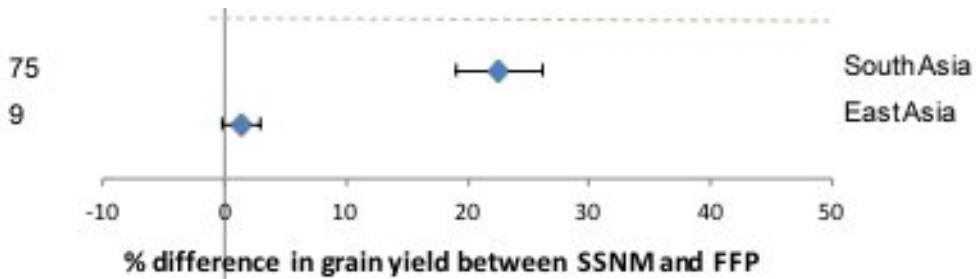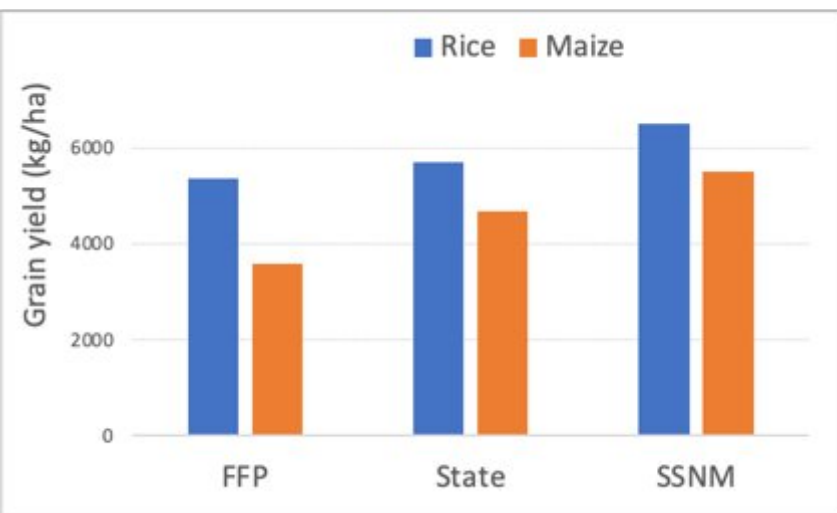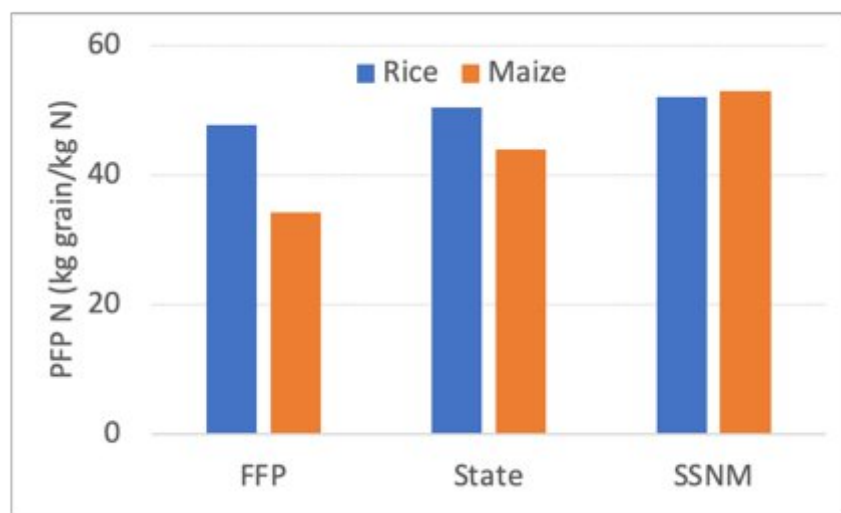
SSNM performance across 9 studies in SSA

21%, 50% greater than FFP in rice, maize
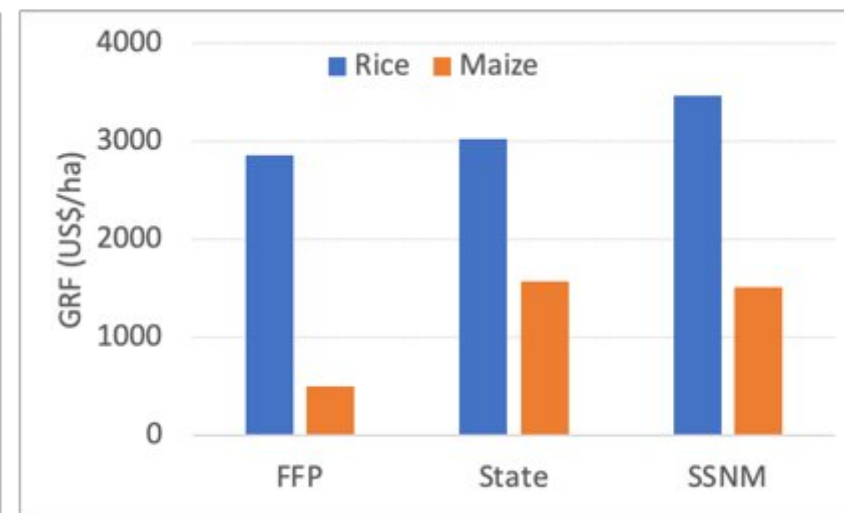
9%, 54% greater than FFP in rice, maize

21%, 300% greater than FFP in rice, maize

14%, 17% greater than state rec in rice, maize

3%, 21% greater than state rec in rice, maize

15% greater than state rec in rice, 4% lower than state in maize

Chivenge et al. (FCR, 2021)

Future Direction and Highlights

Link with geospatial tools for scaling

Develop and calibrate proxies to estimate INS

Link with service providers

Access to reliable & timely weather forecasts

Intentionally include micronutrients to improve human nutrition

Need public-private partnerships to create dissemination channels

Investment and policies to create an enabling environment to support adoption

Develop sustainable business models

Thank You

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