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Agrometeorological Services for smallholder farmers in West Africa

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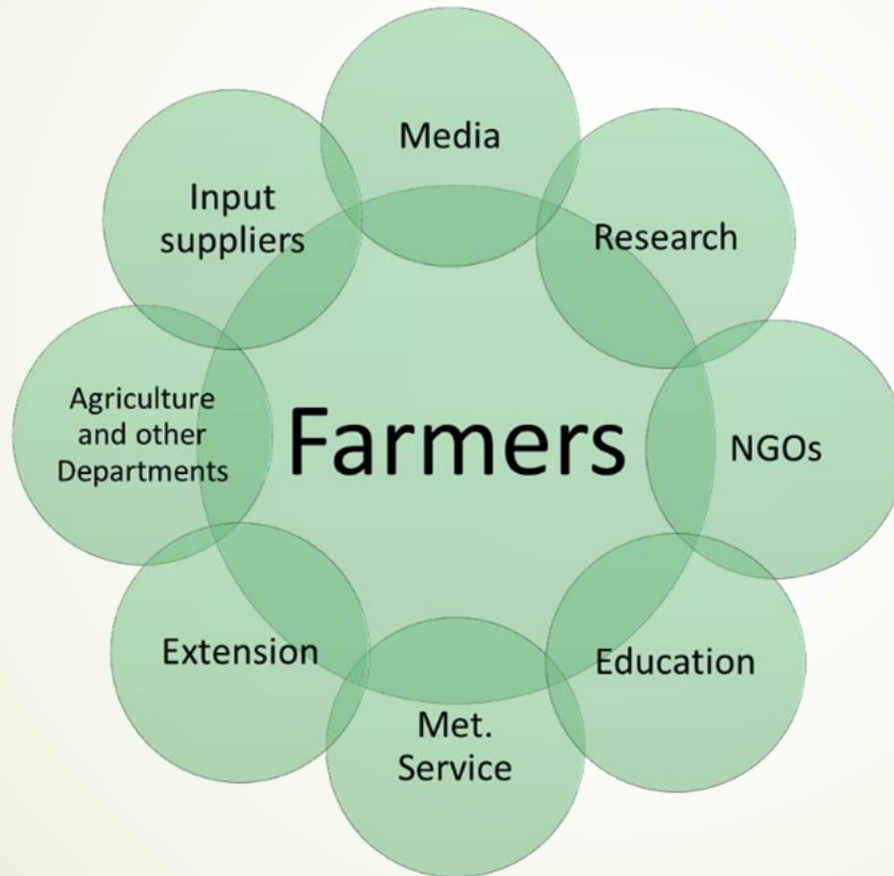
1. METAGRI and METAGRI Operational projects

financed by Spain and Norway and implemented with the national meteorological services of 17 countries in West Africa



METAGRI 2008-2015	
Roving Seminars	428
Rain gauges	8152
Flags (sets)	200
Total trainees	20326
Trained Farmers	18206
Trained Women	2479
Trained E. Agents	2120
Villages	7258

1. Agrometeorological services for smallholder farmers



CSA

Agricultural Innovation System

3. Research question

Hypothesis : agrometeorological services can effectively improve agricultural productivity and increase farmers' income

- Which are the impacts of agrometeorological services on farmers behaviour?
- Which is the added value of agrometeorological services for farmers within the AIS of Mauritania?

5. Methodology

The Assessment



- Assessment on 2 years 2015-2016
- 8 Roving Seminars
- 8 Sites
- 16 pilot and 16 control farmers



Survey tools

Period	Behavior (questionnaire)	Productivity (field measure)
Pre-season (RS)	General information about the farmer and farming system	
Mid-season	Information on the onset of the crop and practices used	Data on the crop after establishment
End of season	Information on the whole season and practices used	Data on the crop at maturity/harvest

4. Methodology

CS within Mauritania's Agriculture Innovation System

CS within the METAGRI approach :

- Information on weather extremes and climate change (through RS),
- Provision of training and rain-gauges to farmers (through RS),
- Sowing calendar to be used in association with observed rainfall (through RS),
- Seasonal forecasts, expected sowing periods and related advice (through RS, local media and extension services),
- Weather forecasts (through local media),
- 10-days agrometeorological advices (through local media and extension services).



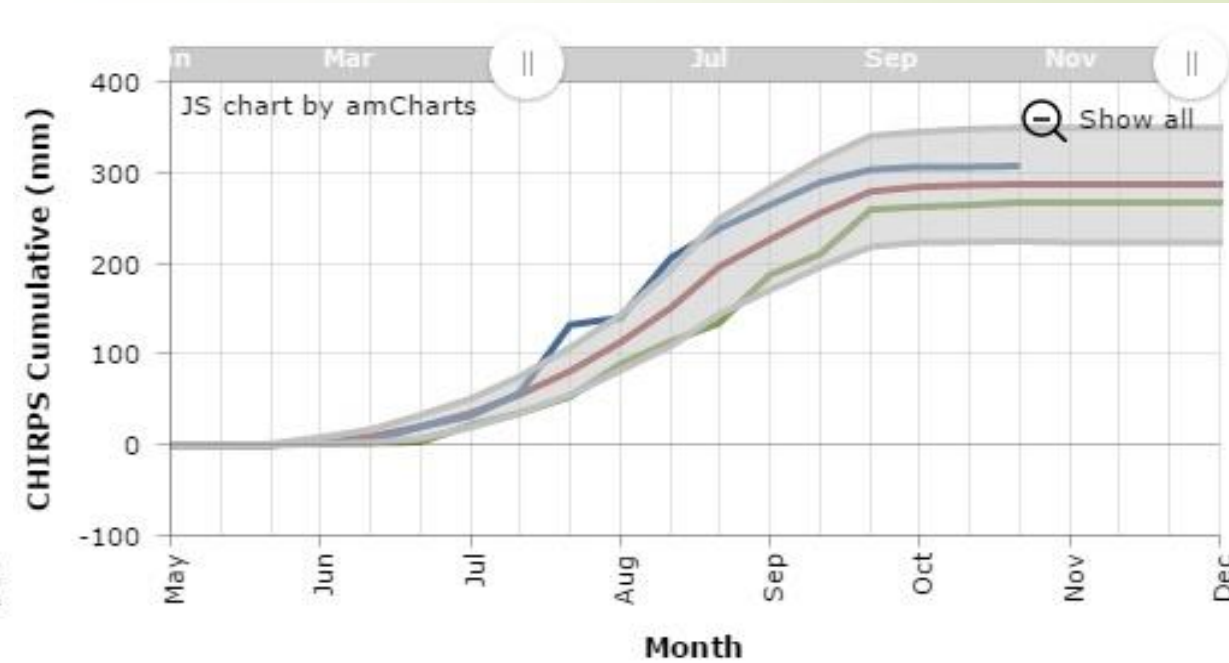
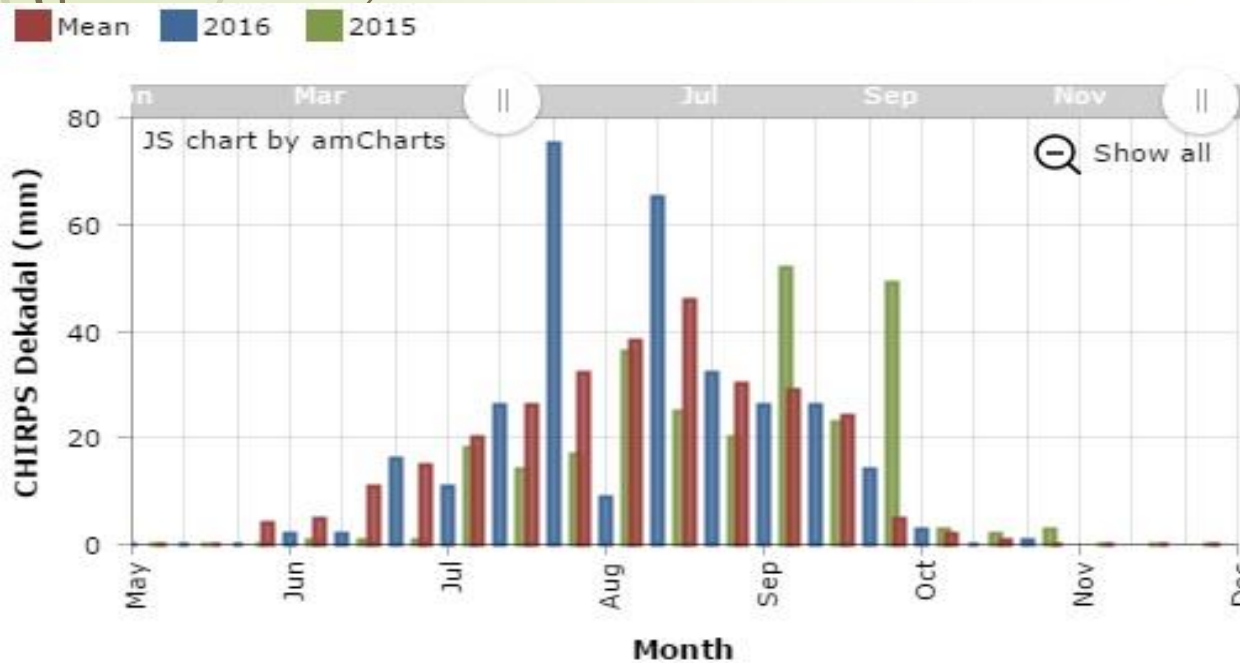
Agriculture Innovation System

Partners	Agriculture Dept.	X
	Other Technical Services	X
	Research	
	Intern. Org.	X
Dissemination	Ag. Ext. Service	X
	NGOs	X
	Farmers' Org.	X
	National Media	X
	Local Radio	X
	Cellphone (texting)	X
	Criets	X

6. Methodology

Agrometeorological conditions

- False starts (2015&2016)
- Late onset (2015&2016)
- Cumulated amount higher than average (2015&2016)
- Early end (2016)
- Length 70-90 days



7. Results

Traditional vs. informed decision-making

Practice	Traditional decision	Agrometeorological services	Main advantages
Land preparation	Soil moisture, empirical knowledge, indigenous indicators	Advice based on seasonal forecasts and crop calendar	Reduces weeds cover before sowing
Crop variety choice	Locally available varieties, good taste and marketable	Advice based on seasonal forecasts and crop calendar	Crop cycle better fits seasonal pattern (season length, dry spells)
Sowing	First rain, indigenous indicators	Rainfall on the rain gauge according to specific thresholds and in relation to the sowing calendar and weather/seasonal forecasts.	Avoids sowing failures, re-sowing, coincidence of most vulnerable crop stages with dry spells
Weeding	Abundance of weeds	Phenological phase, soil moisture and weather forecasts.	Reduces weeds growth
Fertilization	Late development, weak plants, yellow leaves	Phenological phase, soil moisture and weather forecasts.	Avoids fertilizers leaching and crop scorching
Pesticide treatments	Level of crop damage	In case of outbreaks, according to weather observation and forecasts	Avoids pesticides leaching

8. Results

Comparative advantage

Year	2015+2016								Sowing	dekad
Crop	sorghum								Control	21
									Pilot	22
Var.	Variety (days)	N. sow ings	Failure rate %	SCR %	Seed lost kg/ha	N. weed ings	Yield kg/ha	Filling rate %	MS_ Cond.	ES_ Cond.
Control	135	2.65	14%	52%	15.4	3.5	718	56%	f	f
Pilot	105	1	3%	74%	0	2	1173	90%	g	g/vg
Diff. %	-22%	-62%	-81%	42%	-100%	-43%	+64%	+60%		
p t.test	6E-06	4.5E-10	1.9E-04	4.7E-08	6E-9	1.2E-12	6.5E-12	7.99E-09	-	-

9. Results

Added valued

US\$/ha	pilot			control			Diff.%
	2015	2016	Aver.	2015	2016	Aver.	
Costs							
Soil preparation	20.75	20.75	20.75	20.75	20.75	20.75	0%
Seeding	18.45	18.45	18.45	36.90	52.85	44.88	-59%
Weeding	83.00	83.00	83.00	134.88	155.63	145.25	-43%
Harvesting	41.50	41.50	41.50	41.50	41.50	41.50	0%
Total costs	163.70	163.70	163.70	234.03	270.73	252.38	-35%
Income							
Production kg/ha	1 300.00	1 046.67	1 173.33	800.00	635.00	717.50	+64%
Net yield kg/ha	975.00	785.00	880.00	600.00	476.25	538.13	+64%
Value US\$/ha	487.50	392.50	440.00	300.00	238.13	269.06	+64%
Benefit US\$/ha	323.80	228.80	276.30	65.98	-32.60	16.69	+1556%

10. Conclusions

SWOT

- Strengths: strong relation among NMS, extension and pilot farmers (excellence of Mauritania vs other countries)
- Opportunities: ICT in information and advices dissemination; integration with traditional knowledge, synergies with other elements of the AIS
- Weakness: adoption at scale level, project approach
- Threats: ratio farmer/extensionists and Km²/extensionist, cultural barriers,

11. Conclusions

The way forward

- Consider Weather and climate information embedded in agricultural development packages
- Improve communication
- Local challenges and barriers must be overcome considering specific local needs
- From projects to AISs (innovation/sustainability)
- Need to continue and improve the assessment (time and space)
- Better analyse behavioural and social aspects

Thank you

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- *Tarchiani, Vieri, et al. "Weather and climate services for farmers: impact assessment in West Africa". In : New adversities and new services for agroecosystems, F. Ventura and L. Pieri (eds.). Bologna University. 2016. DOI.10.6092/unibo/amsacta/5164*
- *Tarchiani, Vieri, et al. "Smallholder Farmers Facing Climate Change in West Africa: Decision-Making between Innovation and Tradition." Journal of Innovation Economics & Management (2017): art13_I-art13_XXVI.*