Field intervention results

ILSSI External Evaluation, 2017

Presented by IWMI

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RESEARCH OBJECTIVES

Identifying with stakeholders potential solutions that will enable farmers to transform their livelihoods through economically and environmentally sustainable adoption of SSI

- What technologies, tools and approaches enable women and men farmers to profit, increase resilience and improve wellbeing?

  water access, water scheduling, technologies for water lifting comparison, conservation agriculture techniques, cost-benefit

- How can the pathway to sustainable adoption and use be enabled for women and men farmers?

  micro and rural finance, value chain opportunities, price analysis, high value/potential crops

- Can adoption be sustainable in landscape?

  monitoring of water and soil resources use on landscape scale: availability, quality, dryspells

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FIELD INTERVENTIONS

- Irrigated high value crop production for economic/environmental sustainability, resilient livelihoods
- Conservation agriculture practices integrated into irrigated production
- Assessment of livestock feed resources, importance/demand for planted forage, and forage preference
- Testing annual and perennial grasses and legumes for biomass production (and effect on soil fertility and water utilization)
- Livestock productivity trials and modeling of animal performance (forage yield >forage quality> estimation of meat and milk production)
- Fodder market studies for demand, price – quality relationships, value chain
- Water and land use, quality and sustainability at landscape scale (watershed impacts, groundwater recharge, water quality)
- Microfinance (based on stakeholder demand/emerging constraints)
- Data for ex-ante assessments to assess impact and potential for scaling

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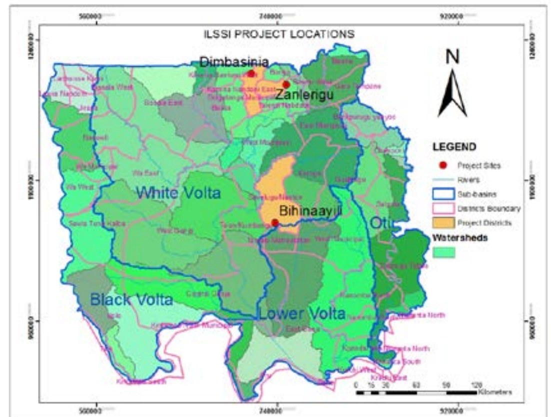
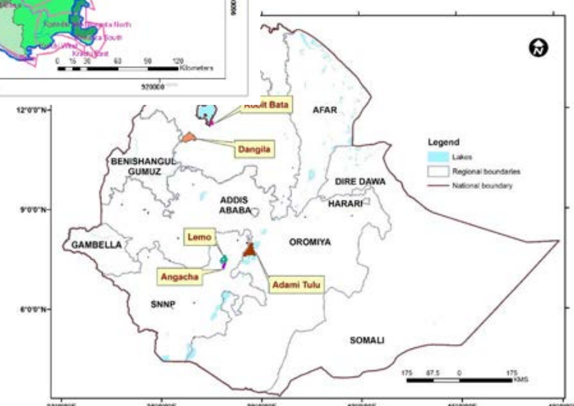
SITES AND INTERVENTIONS

- Water lifting technologies
- Irrigation scheduling tools
- Crops
- Microfinance options
- Water and soil analysis
- Gender disaggregation



Ghana

Tanzania



Ethiopia

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SITES AND INTERVENTIONS

Country	Region	District	Village	Water source	Intervention(s) – technologies
ETHIOPIA	Amhara	Dangila	Dangeshta	Groundwater	Pulley, Rope and washer pumps, irrigation scheduling; Restrictive layer (groundwater recharge); Vegetable and fodder testing; Conservation agriculture experimental plots with women farmers
	Amhara	Bahir-Dar Zuria	Robit	Groundwater/river	Pulley, irrigation scheduling; Vegetable and fodder testing; Conservation agriculture experimental plots with women farmers
	Oromia	Adami Tulu	Bochesa	Groundwater/Lake/river	Motor pumps & furrow irrigation, Rope and washer pumps, irrigation scheduling; vegetable and fodder testing
	SNNPR	Lemo	Upper Gana	Groundwater/river	Solar pump, Rope and washer, service provider & drip, irrigation scheduling; Vegetable and fodder testing
GHANA	Northern	Savelugu	Bihinaayili	surface/streams	Pump, tank and hose
	Upper East	Nabdam	Zanlerigu	shallow ground	Pump, tank and hose
	Upper East	Kassena Nankana E.	Dimbasinia	shallow ground; surface	Pump, tank and drip kits
	Northern	Savelugu	Yemu		Drip kits with conservation agriculture (iDE as partner) with women farmers
TANZANIA	Morogoro	Kilosa	Rudewa	surface (Rudewa)	Motor pump with furrow irrigation of tomato and African eggplant, deficit irrigation for furrow and drip, pocket gardens,
	Morogoro	Mvomero	Mkindo	surface (Mkindo)	Motor pump with furrow irrigation of tomato and African eggplant, irrigation scheduling, pocket gardens, deficit irrigation in furrow systems; Conservation agriculture experimental plots with women farmers
	Manyara	Babati	Babati	surface	Fodder Testing

METHODOLOGICAL APPROACH – PARTICIPATORY ACTION RESEARCH

+ Integrates farmers and local stakeholders into research, learning and development of solutions in practice
+ Provides qualitative data on farm/household level, finance and institutional constraints and opportunities related to upscaling (market dynamics, behaviour in moving to irrigated/commercial production, incentives)
+ Quantitative data grounded
+ Integrates capacity development into research across stakeholder groups

- Presents challenges for data collection (consistency, extent, quality)

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EMERGING RESULTS

Farmer, sharing her knowledge on how to irrigate using the wetting front detector (WFD)
(Photo: Petra Schmitter, IWMI)

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AWM TECHNOLOGIES' POTENTIAL

Emerging messages: Need to work from multiple perspectives (of benefit) to provide incentives for farmers

	Labor saving	Yield	Water productivity	Profit	Multi-purpose use
Control	0	0	0	0	0
RW	0	0	0	-/0	+
Solar	++	+	0	++	++
Service provision & drip	+/-	++	++	+/-	-

Summary of the opportunities and challenges related to each of the water lifting technologies towards the control (=manual water lift from surface or groundwater).
++, + and – represent a high, medium and low effect.

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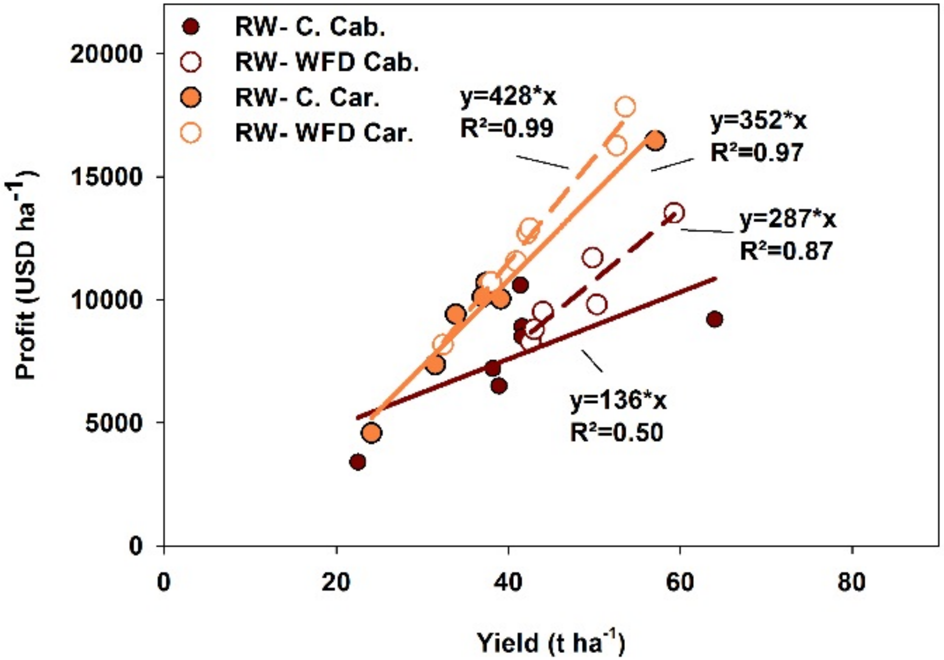
IRRIGATION SCHEDULING IMPROVES OUTCOMES OF WATER USE IN SSI

Emerging messages:

- Scheduling tools can improve water use effectiveness, productivity
- Increase yields, profit
- Improve fertilizer, land productivity
- Must have high value produce to achieve profit
- Reduce labor (and cost) is the *major incentive*



Yield (t ha^{-1}) and corresponding profit converted to USD ha^{-1} for cabbage and carrot for the rope and washer technology (RW) when irrigation was performed without support of a WFD (control, C.) and with a WFD.

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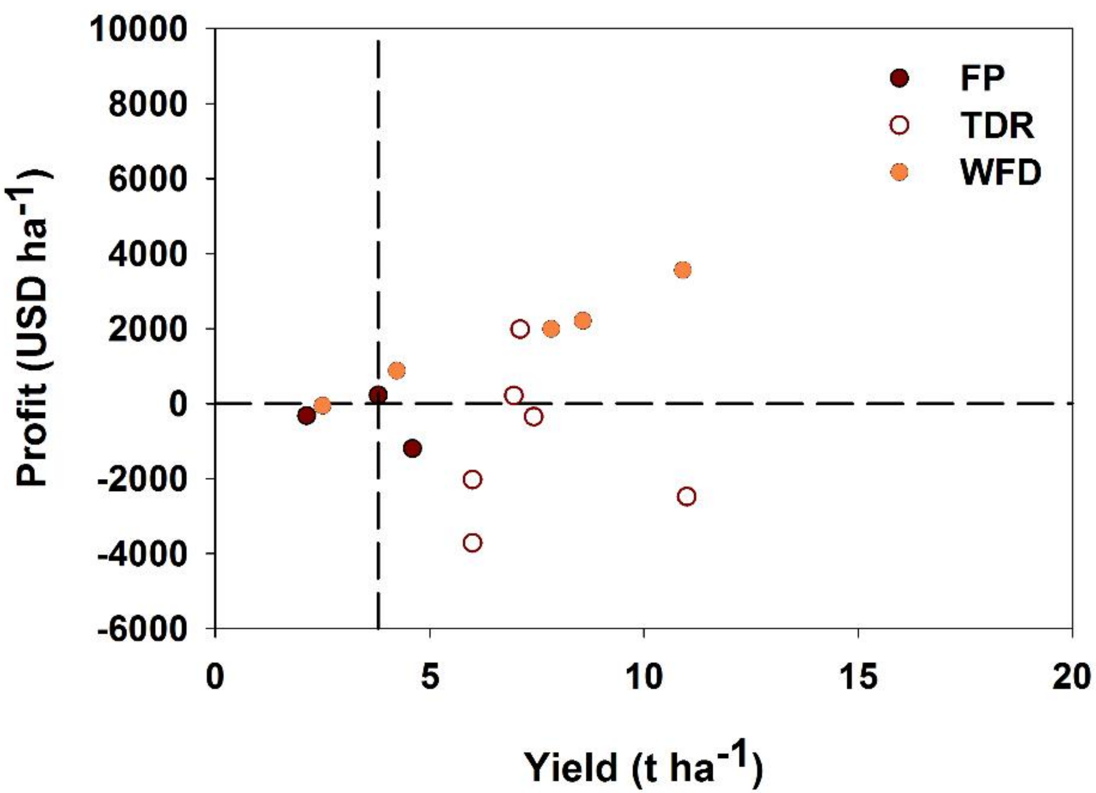
IMPROVED WATER MANAGEMENT CAN IMPROVE PROFITS



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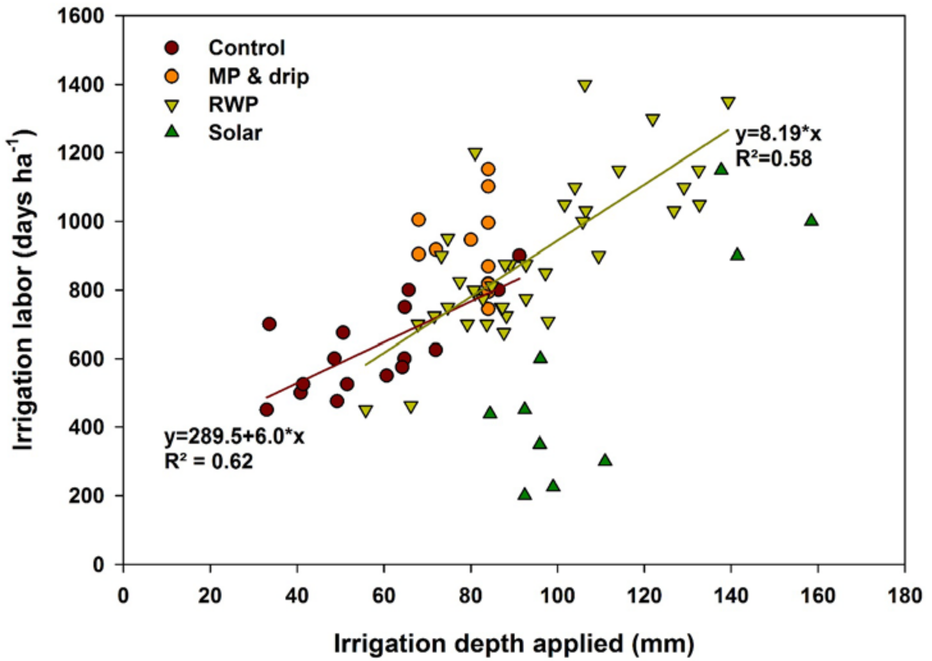
LABOR AS A MAJOR CONSIDERATION

Emerging messages:

- Technologies that save labor are more profitable (and more preferred)
- Technologies follow incremental irrigation-labor linear relation. Manual most labor intensive, motorized (usually) lowest labor input for amount of water applied.

(Motorized here includes distance to fetch water by service provider which increases labor)



Irrigation depth applied during 2016 and associated number of irrigation labor days to irrigate one hectare

CONSERVATION AGRICULTURE

Ethiopia and Ghana: **Significant vegetable yield increase under CA**

(Yield increase by 31% onion and 55% garlic in Dangishita; 9% cabbage and 71% garlic in Robit; sweet potato 57% in Yemu)

Managements	Dangishita (kg/50 m^2)			Robit (kg/50 m^2)			Yemu, Ghana (kg/50 m^2)		
	Garlic	Onion	Tomato	Tomato	Garlic	Cabbage	Sweet potato	Green pepper	Cucumber
CA	18.96 +/- 7.29	15.98 +/- 3.31	No harvest (frost)	89.21 +/- 71.67	8.37 +/- 1.308	117.89+/- 22.54	79.5 +/- 27.97	6.1 +/- 3.33	No yield (disease)
CT	12.23 +/- 4.22	14.04 +/-2.21		31.44 +/- 21.51	4.91 +/- 3.13	107.72 +/- 21.47	50.7 +/- 9.8	1.8 +/-0.43	
P-value	0.001***	0.138^{ns}	-	0.08*	0.09*	0.055*	0.015**	0.024**	

Note: Data above represents mean/confidence interval; *** p<=0.01, ** P<=0.05, * P<=0.1, ^{ns} not significant at α= 0.1

CONSERVATION AGRICULTURE

Ethiopia: **Significant irrigation water use *decrease*** observed under CA (Dangishita 14 -16%; Robit 18- 51%)

Managements	Dangishita (1000 L/50 m^2)		Robit (1000 L/50 m^2)		
	Garlic	Onion	Tomato	Garlic	Cabbage
CA	18.6 +/- 5.22	5.90 +/- 3.1	17.98 +/- 7.71	7.2+/- 1.54	12.99+/- 2.07
CT	21.75 +/- 4.83	10.85 +/-2.7	22.0 +/- 7.77	10.91 +/- 2.85	15.87 +/- 2.94
P-value	0.0004***	0.00007***	0.0004***	0.08*	0.0004***

Note: ET = Evapotranspiration; Q = Surface runoff ; PRK = Percolation below root zone; IRGA = Irrigation water applied

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IRRIGATED FODDER/FORAGES

Allocating land and water exclusively for forage production mostly new but in Ethiopia land allocation and seed demand clearly on increase

High demand for fodder and shrinking traditional fodder resources potent driver for new fodder technology adoptions, Napier, Desho and oats-vetch emerge as preferred options

Increasing demand for forage planting, more land allocation, more farmer from year 3 to 4 for example oats vetch seed demand up from 100 kg to 400 kg

More attention needs to be given to fodder cultivation as cash crop - need to move from try and error to structured approach using decision-making tools

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FODDER MARKETS EMERGING IN SSA

	Total milk produced if cows give			
	3 kg	6 kg	9 kg	12 kg
Milk yield from use of single cut oats-vetch produced from 100 m^2	61 kg	118 kg	147 kg	167 kg
Return from sales of milk assuming 12 Birr/kg	732	1416	1764	2004
Selling Desho at market assuming 1.75 Birr per kg forage fresh	1185			

- Varied levels of profit – milk vs fresh sale
- Potential for women farmers

TECHNOLOGIES ARE FEASIBLE, PROFITABLE + BENEFITS

Emerging messages:

- Farmers perceive multiple benefits, range of incentives to adopt/sustain; even manual technologies may offer irrigation + WASH, clean water, reduced labor
- Labor costs (including household) can reduce profit or make unfeasible
- Technologies not highest cost - most are feasible: High value crop enable payback period < 1 to > 4 years
- Credit access could enable adoption
- Crops should be very high value to optimize profits/economic sustainability
- Some crops favored for irrigation are least profitable (e.g. onion), neglected but nutritious crops can be more profitable (amaranth, corchorus)

CA OFFERS FARMERS BENEFITS FOR LABOR, WATER

Opportunities

- Farmers easily master the system
- Savings with water, soil, labor
- Improved yield quantity and quality
- Potential to improve resilience and livelihoods
- Potential role in enhancing nutrition and empowering women (home consumption plus commercial sales)

Challenges

- Competitive uses for mulch (shortage)
- More pests under CA (Tanzania)
- Availability of drip parts for maintenance
- Water delivery issue, shortage, flooding
- Livestock destruction (Ethiopia and Tanzania)
- Insufficient agronomic advisory services to support/enable

IRRIGATED FODDER - STRONG POTENTIAL

- Irrigated forage is a serious proposition for small scale irrigation, agreement between empirical observations and ex-ante assessments
- Feeding to own livestock economically attractive where genetic potential for response, particularly in dairy (however labor/drudgery issues!)
- Forage as cash-crop not a second class options but be can be attractive, and more, than feeding to own livestock
- Value chain approach required (*feed/fodder value chain*) with attention given to off-farm actors, activities and transactions
- On farm constraints - water shortage - recurring

INCREASING OPPORTUNITIES FOR MICROFINANCE

Ethiopia – Comprehensive description of MF context for irrigated production, econometric analysis of access-adoption links. Low literacy, numeracy, especially for women; need to carefully target inclusion of women in trainings.

Message: Access to MF does have impact on decision to adopt but only positive in certain conditions (gender, age of labor in household)

Ghana – Comprehensive description of MF context for irrigated production

Message: Shift in rural finance sector (supply): View irrigated production as lower risk than rainfed. Farmers (demand): Prefer informal or semi-formal credit due to high cost of credit

Tanzania – Assessing farm group sizes per land size in relation to microfinance

Message: Pump sharing groups may have an ideal size for context, but conflicts run high among groups.

RESULTS TO OUTCOMES: CURRENT

- Expanding areas in Ghana (outward from intervention sites); Seed producers linking to sites; Experimentation with inter-cropping; Men willingness to grow crops beyond onion, tomato (consider women's crops); Ghana Irrigation Development Authority expressed interest in WFD training
- Requests in Ethiopia for additional information, demonstration, training on WFD; Expanded areas (outward from intervention sites), including youth groups that adopted (Robit)
- Recognition in Tanzania of need to change crop/water information to farmers in intervention site areas; Expansion of sack gardens by women
- Partner (iDE) in Ghana adopted CA practice (esp mulching) in all interventions
- Increasing demand for forage planting, more land allocation, more farmers

SCIENTIFIC OUTPUTS TO OUTCOMES

- Water productivity-Labor-Yield paper(s)
- Econ feasibility/sustainability paper(s): Cost-benefit across countries; Price analysis (Ghana)
- Microfinance papers: Opportunities and areas for intervention (Ghana); Microfinance and impact on adoption of SSI (Ethiopia); Group borrowing dynamics (Tanzania)
- Qualitative interviews with farmers post-interventions: Learning; Perceptions on SSI technologies & benefits; Incentives; Project reflection
- Support student completion and publications before July 2018
- Irrigated fodder decision-support tool
- Irrigated fodder value chain assessments

OUTREACH TO OUTCOMES

Knowledge products: microfinance, WFD (training materials), water management-yield-profit...

	Messages (examples)	Partners	Events
Ghana	WFD can improve water use, yield and profit Microfinance opportunities for SSI	SADA and MoFA GIDA Finance	Farmer forums/exchg 'Results workshop'
Ethiopia	WFD Technologies/outcomes vary Microfinance Irrigated fodder/forages	SSI platform ATA, MoIEA EIAR and others	Farmer forums 'Results workshop'
Tanzania	Technologies Information for extension Irrigated fodder/forages	Irrigation Commission Ministry of Agric/Extension	Farmer forums 'Results workshop'
Gender	Beyond adoption; Target households; Consider groups and social networks	Ghana (GIDA, WIAD) Ethiopia (ATA gender) Tanzania	IWMI to support IFPRI in engagement

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Country	Partner
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	Arba Minch University
	Andassa Livestock Research Center
	Amhara Region Animal Research Institute
Ghana	University for Development Studies
	Animal Research Institute
	iDE
Tanzania	Sokoine University of Agriculture

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