Drip irrigation and service provision of irrigation water: New ways to step into affordable small scale irrigated agriculture

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Outline of the presentation

1. Background
2. Interventions
3. Objectives
4. Study approaches
5. Results and discussions
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7. Conclusion and implications

1. Background

Climate change induced water scarcity and the drive for agricultural transformation underpins irrigation expansion

Many evidences irrigation enhances food security and reduces poverty

Critical questions / challenges:

- Increasing efficiency – drip irrigation
- Increasing irrigation access – provision irrigation service delivery

AR/IWMI interventions in Lemo district, SNNP – irrigation technologies

Focus interventions: Water delivery (left) and drip irrigation (right)

2. Research objectives

- *Compare crop and water productivity* of high value crops under drip irrigation compared to farmers' practice,
- Conduct *cost-benefit analysis* to explore whether *drip* technology is economically feasible,
- Explore if drip irrigation is still viable when the *cost* of *water delivery is included*, and
- Explore if drip irrigation is still viable if *cost of water delivery and value of water is included*.

3. Study approaches

- Crop and water productivity
- Discounted measure of financial viability like Net Present Value (NPV), and Internal Rate of Return (IRR)
- Residual imputation method – estimate value of water

Key assumptions

Type of assumptions	Description	Bench mark
Life span of the drip structure	Includes drip kit and tanker plus other accessories	5 years
Investment cost of drip kits	Drip kits which cover 2500 m^2	2400 ETB
Investment cost of Tanker	Tanker with water holding capacity of 1000 liters	3500 ETB
Installment cost	Installing the drip kit with appropriate spacing and emitters 1000m2 per day	500 ETB

Key assumptions …

Transport and logistics	Transporting the drip kits and tankers	2000 ETB
O&M cost	Of the emitters of drip kits (starting the 2nd year)	10 %
Discount rates	Opportunity cost of capital	8 %, 12.25 % and 16.5 %

Crop and water productivity

Variable	Uper Gana	Control	Jawe	Control	Sig-test (p-value)*
Cabbage crop productivity	60 t/ha	41 t/ha	63 t/ha	44 t/ha	0.05
Carrot crop productivity	68t/ha	38 t/ha	65t/ha	35 t/ha	0.05
Cabbage water Productivity	15.5 kg /m3	8.4 kg/m3	13.3 kg/m3	8.7 kg/m3	0.05
Carrot water productivity	14.4 kg/m3	6.8 kg/ha	11.8 kg/m3	7.2 kg/ha	0.05

Source: farm book 2015/16

*Significance difference between drip and control

ctivity of the planted crops in Upper Gana and Jawe.
5/19
between drip and control

4. Results and discussions: Cost-benefit analysis of drip irrigation in Upper Gana

	Drip	Control	Drip + Cost of water delivery	Drip + Cost of water delivery + Value of water
Discount rates	Discounted benefits			
8%	$160,339.65	$120,152.79	$152,433.52	($16,248.96)
12.25%	$137,584.38	$140,146.21	$130,758.99	($14,865.13)
16.6%	$118,999.85	$120,023.83	$113,058.78	($13,697.92)
IRR	499%	162%	476%	#NUM!

Source: farm book 2015/16

Cost-benefit analysis of drip irrigation in Jawe

Drip	Control	Drip + Cost of water delivery	Drip + Cost of water delivery + Value of water
$42,912.14	$168,811.87	$121,810.42	($10,142.08)
$105,875.27	$182,316.82	$104,321.97	($9,593.04)
$91,399.05	$266,130.26	$90,047.00	($9,108.89)
390%	165%	385%	(#NUM!

Results & discussion …

- Drip irrigation is feasible in both Upper Gana and Jawe, more feasible in Upper Gana than Jawe.
- Growing cabbage and carrot is even financially feasible under farmers practice – effect of supplementary irrigation.

Results and discussion …

- Including the cost of water provision in the cost-benefit analysis doesn't decrease the financial feasibility of drip technology.

  ➡ Thus, charging farmers for the costs (both labor and fuel cost) of water provision makes economically sense.
- Including the value of irrigation water makes drip irrigation infeasible.

➡ Introducing some sort of water fee may not make economic sense.

5. **Scaling up the technology**

- Feasibility analysis results indicated that both drip irrigation and water delivery service is economically feasible
- Presence of local organization engaged in supply of irrigation technologies
- Linking with appropriate microfinance services is required

Scaling up the technology …

- Irrigation water service delivery is new in Ethiopia; cooperative societies and private investors could be target stakeholders

- Feasibility of water provision as a business, from the supplier side, needs further inquiry.

- Development Bank of Ethiopia (DBE) could be another partner for vertical out scaling

6. Conclusion and implications

- Crop and water productivity was significantly higher under drip irrigation compared to farmers practices
- Feasibility studies indicated that drip irrigation and provision of water service is feasible.
    - Promote drip with water service delivery

      or
    - Motorized filling of these tankers can really make a positive impact!

- Out scaling a tested technology may require the involvement of various stakeholders

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