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Enhancing water productivity of small scale irrigation in Northern Ghana through improved irrigation and water scheduling technologies

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ILSSI Project
Research Results and Outcomes

Photo: Nana Kofi Acquah

ILSSI Stakeholder Consultation - Ghana, Coconut Grove Hotel Accra - 14th May 2018

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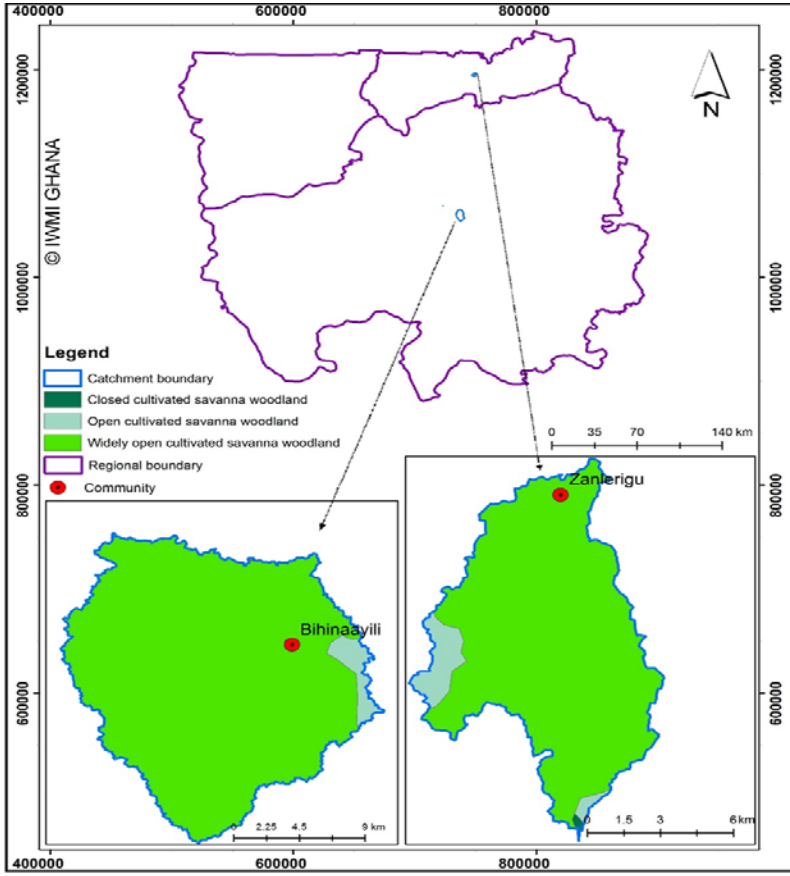
TECHNOLOGIES INTRODUCED

Activities	Farmer practice	Technologies introduced
Water sources	Wells, rivers	Rainwater harvesting
Water storage	Wells, rivers	Tanks
Water lifting	Rope and bucket	Motorized pumps
Water application	Buckets	Hose, drip, watering cans
Irrigation scheduling	Crop and soil observation	Wetting front detector (WFD)

STUDY AREA



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INTRODUCTION OF WETTING FRONT DETECTOR IRRIGATION SCHEDULING TOOL

RESEARCH AIM

To introduce the Wetting Front Detector (WFD) irrigation scheduling tool and:

- Evaluate its effect on crop water productivity
- Evaluate whether it gives appropriate and timely information to guide farmers on when and how much to irrigate

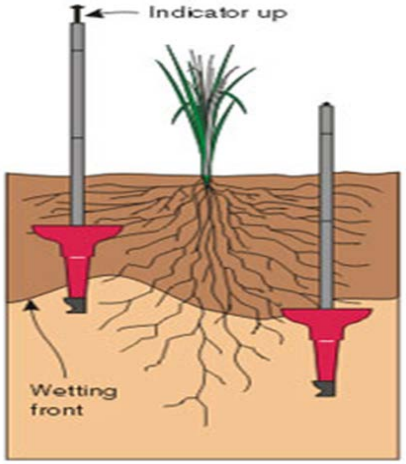
WHY THE NEED FOR A SCHEDULING TOOL?

Over-irrigation

Under-irrigation

WHAT IS A WFD?

Irrigation scheduling decisions can be made easier with the aid of WFDs



No wires

No batteries

No computers

No loggers

No numbers

A simple tool which give a “visual” soil moisture reading that help farmers to “see” what the crop is experiencing in order to make the right decision

Relatively inexpensive compared to “traditional” soil moisture probes

METHODOLOGY

Experimental design

Community	Number of farmers	Reps per farmer	Soil type
Bihinaayili	8 (hose=4; wc=4)	4	Loam
Zanlerigu	8 (hose=4; wc=4)	4	Clay loam

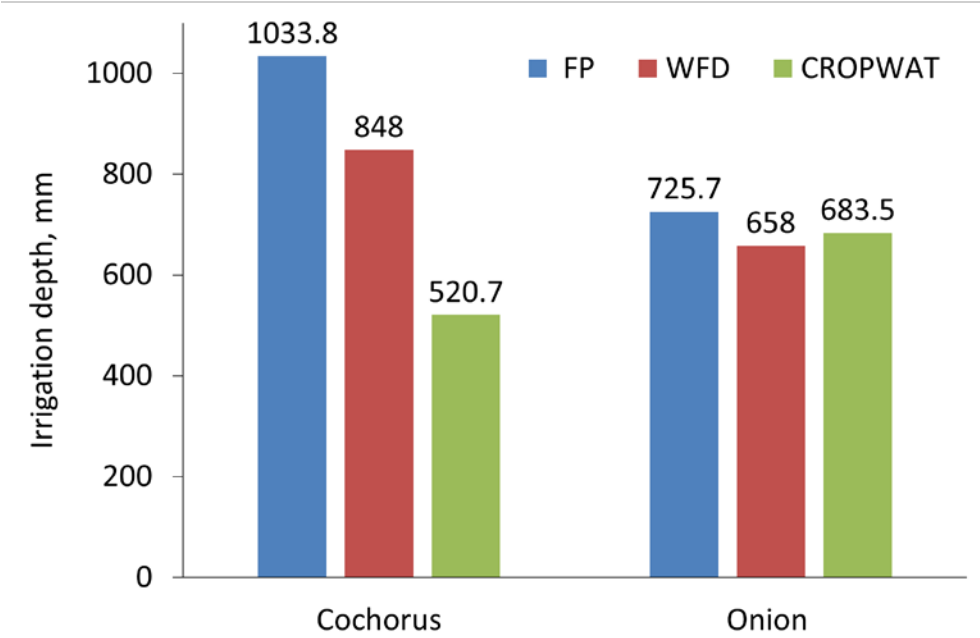
Data Analysis

- Crop water requirement was computed using CROPWAT model
- Physical water productivity $(kg\ m^{-3}) = \frac{yield\,(kg)}{amount\ of\ water\ (m^3)}$
- Economic water productivity $(\mathrm{GH¢}\ m^{-3}) = \frac{Value\ of\ yield\ (\mathrm{GH¢})}{amount\ of\ water\ (m^3)}$

RESULTS (1)

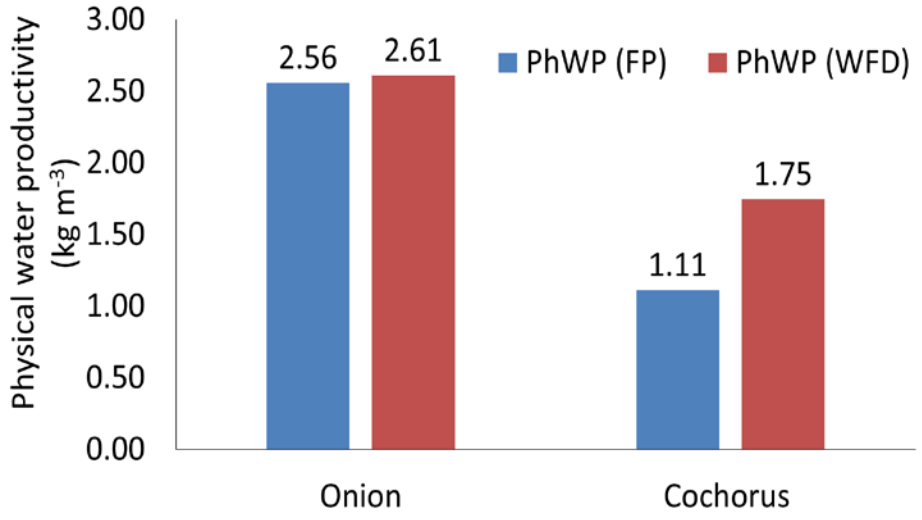
Water Savings

Use of WFD saved up to 22% irrigation water compared with farmers' practice

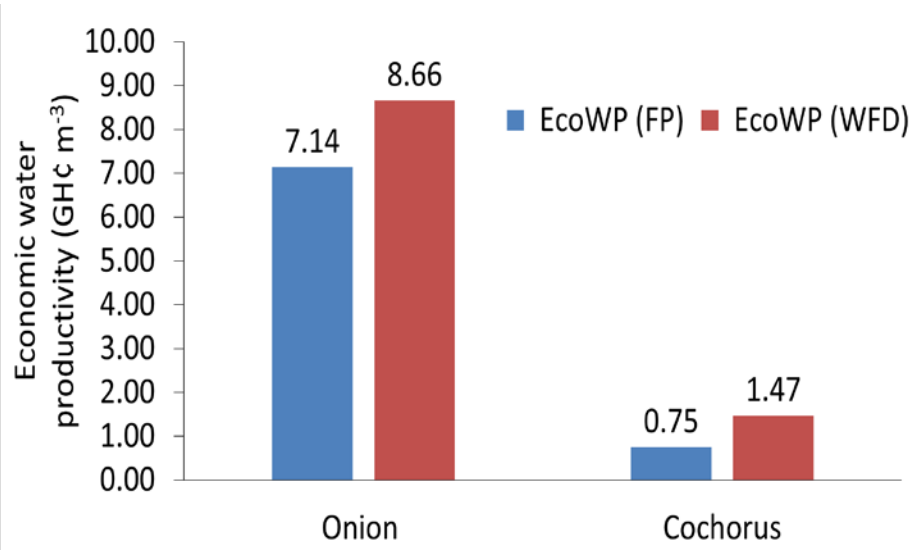


RESULTS – (2)

Physical water productivity

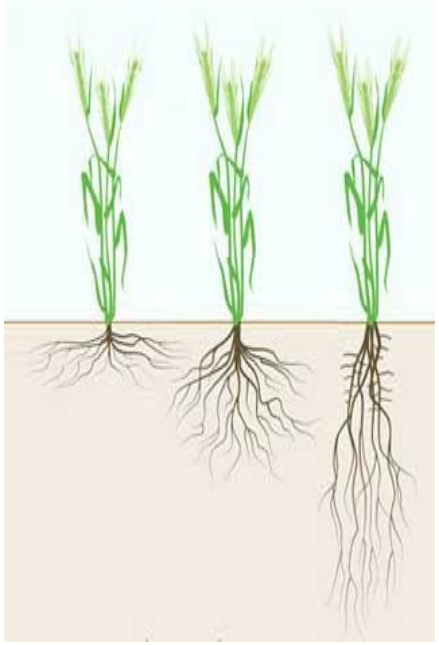


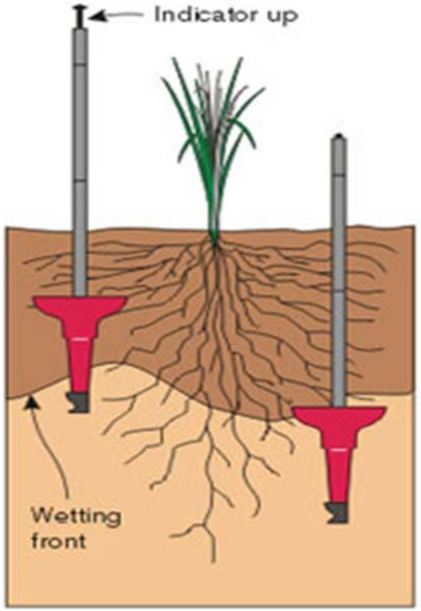
Economic water productivity



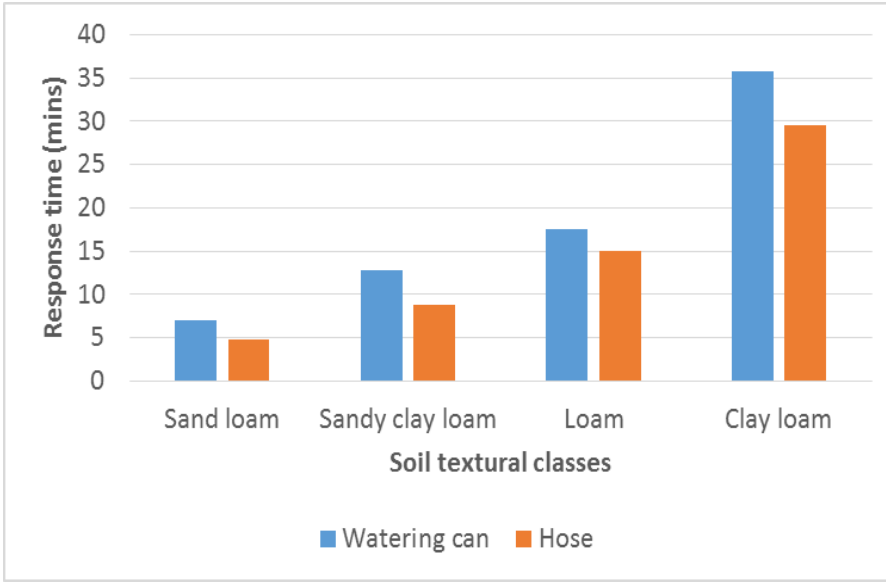
RESULTS – (3)

Fixed installation depth vs. gradual root development





Influence of soil texture & water application method on WFD response time



KEY RESEARCH FINDINGS

1. Farmers can make substantial savings in water without necessary decreasing their productivity when WFDs are used as a guide to schedule irrigation water.

2. Farmers are able to install WFDs and interpret flags

3. The long waiting time in clayey soils is a disincentive for upscaling

RECOMMENDATIONS

1. Introduce WFDs where farmers' primary objectives include water-saving
2. Calibrate different installation depths for different soil textural classes to reduce waiting time
3. Consider different installation depths for different crop growth stages. Additional cost??

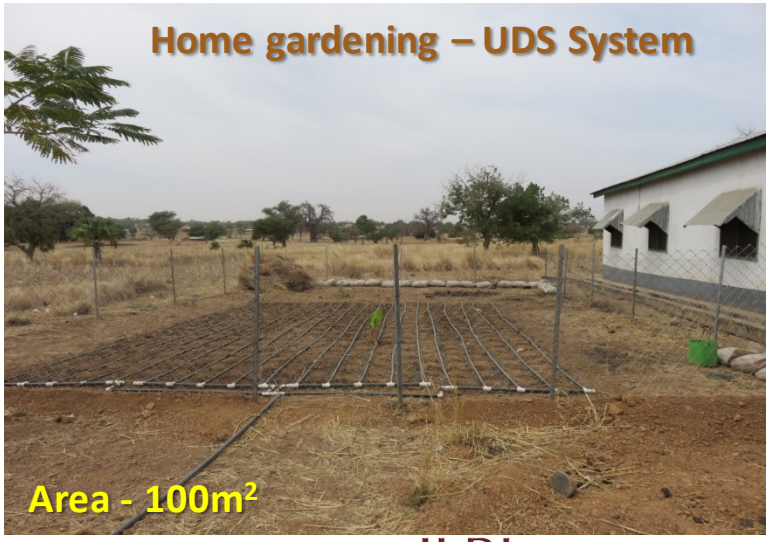
UDS & IDE DRIP IRRIGATION TECHNOLOGIES

RESEARCH AIM

- To evaluate irrigation water saving technologies (drip and water hose) for small scale irrigation.

METHODOLOGY

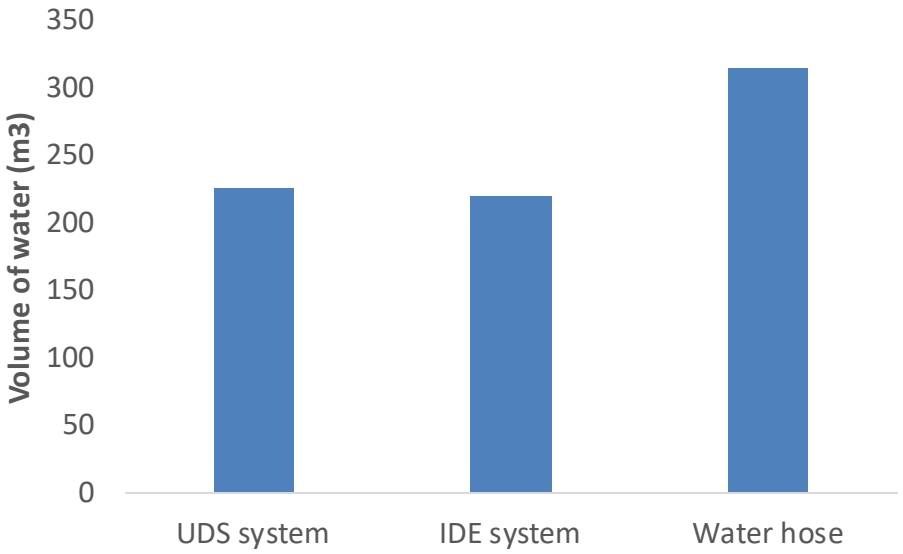
Drip system	No of farmers
UDS	2 (1 female)
IDE	2 (1 female)
Hose	1 (female



RESULTS – HOME GARDENS (1)

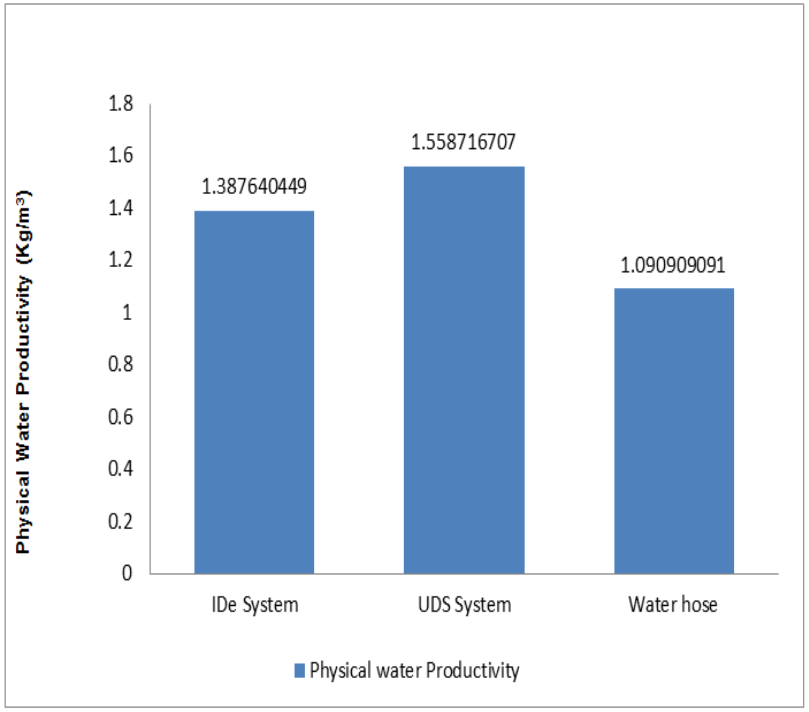
Water savings

No significant difference between UDS and IDE drip system

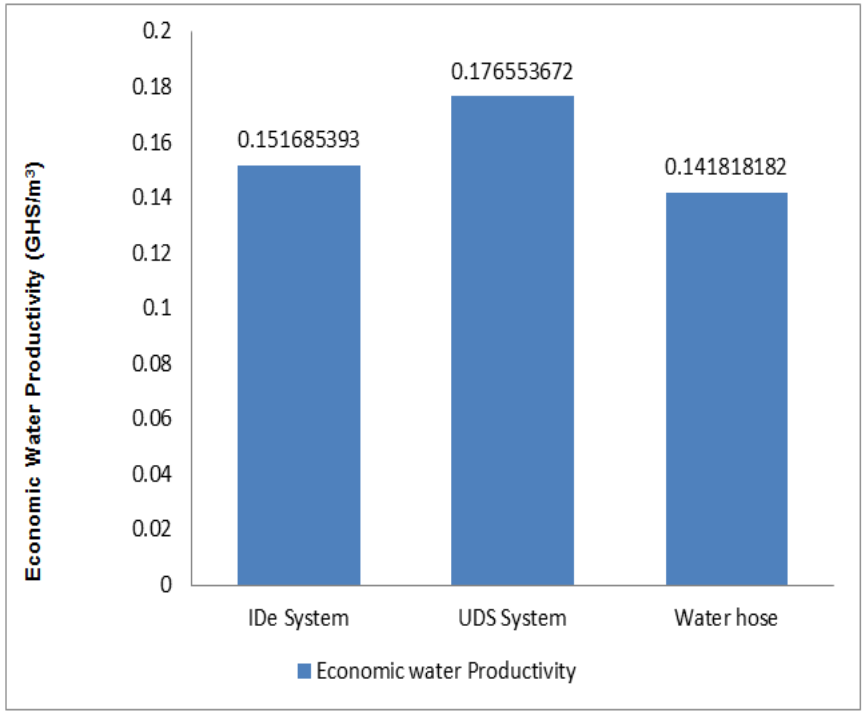


RESULTS – HOME GARDENS (2)

Physical water productivity



Economic water productivity



KEY MESSAGES

1. Home garden is one of the effective means for improving household food security, income and nutrition especially during the dry season.
2. An irrigation technology must be understood, acceptable and easily replicated (using local) materials.
3. Women adopt irrigation technologies faster than men contrary to general perception

RECOMMENDATIONS

1. Small-scale dry season farmers need an initial push (inputs, cash, etc.) in the form of capital
2. There is the need for wider gender education among small-scale dry season farmers following the success stories of ILSSI
3. Introduction of irrigation technologies should be bottom-up approach and should be acceptable by farmers

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