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NARO

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Identified factors preventing farmers and scheme management from increasing their water use efficiency in Africa: Results of applied methodologies in Uganda

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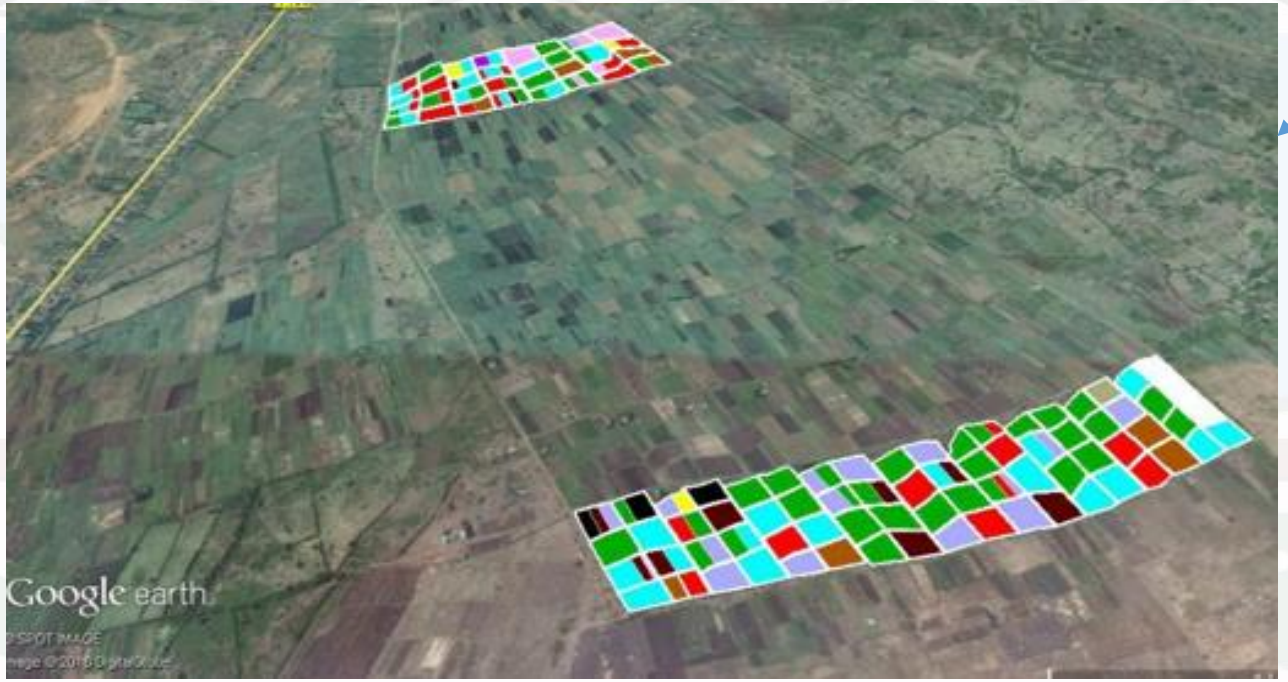
PRESENTATION OUTLINE

- Pilot area location
- Agriculture in Uganda
- Challenges of the pilot areas
- Factors preventing farmers and management from increasing water use efficiency
- Field Interventions to improve water use efficiency;
- Results from use efficiency improvement interventions
- Lessons learnt and recommendations

PILOT AREA LOCATION



Mubuku

Location in Uganda

Coordinates: 00°15′41″N 30°07′27″E

Country	Uganda
Region	Western Uganda
Sub-region	Rwenzururu sub-region

Challenges of the pilot areas

- Low water use efficiency (32% to 46%);
- Inadequate mobility of extension workers within the scheme;
- Water logged farms (80 Ha; 15.5% of scheme);
- High postharvest losses (50%)

Challenges of the pilot area

- Low water productivity (0.6Kg/M^3 to 1.08Kg /M^3 of water);
- Water shortage due to increased water users upstream;
- Poor fertilizer usage;
- Non responsive irrigation schedules

Challenges of the pilot area

- High prevalence of pests and diseases;
- Poor Marketing (exploitation by middle men);
- Inadequate irrigation extension services;
- Passive Water Users Association

Fig.1: Arm worm.

Fig.2: Maize Streak Virus.

Factors preventing farmers and scheme management from increasing their water use efficiency

- Dilapidated infrastructure (seepage losses, leakages and limited control);
- Lack of specialized water measuring tools and equipment;
- Inadequate capacity for data capture and management;

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Fig.3: Dilapidated tertiary canal & turnout

Factors preventing farmers & scheme management from increasing their water use efficiency

- Inadequate capacity for agricultural water management;
- Irrigation schedules that do not respond to user demand and climate smart agric. practices;
- Mindset that the more water you apply the better the results.

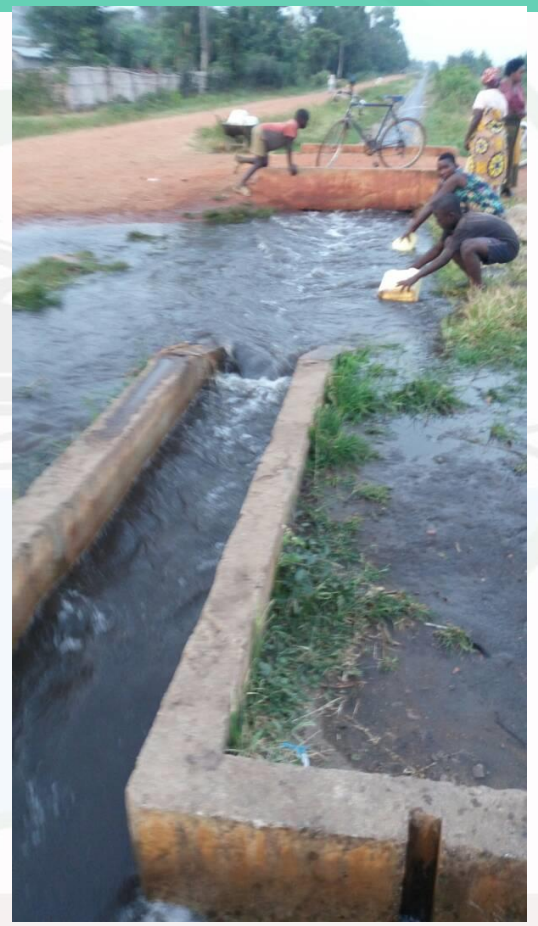

Fig.4: Canals overflow.

Field interventions to improve water use efficiency in Uganda

Infrastructure improvement:

- 15 Tertiary canals lined to reduce seepage losses and to confine flow within the turnout for improved control;

- 15 Field canals reconstructed and bed levels raised to allow for easy flow manipulation and diversion to furrows;

Fig.5: Improved Tertiary and Field Canals.

Field interventions to improve water use efficiency in Uganda

Water Accounting Improvement:

- Measurement structures installed at strategic points along selected secondary canals, calibrated and equipped with staff gauges for quick flow data capture;

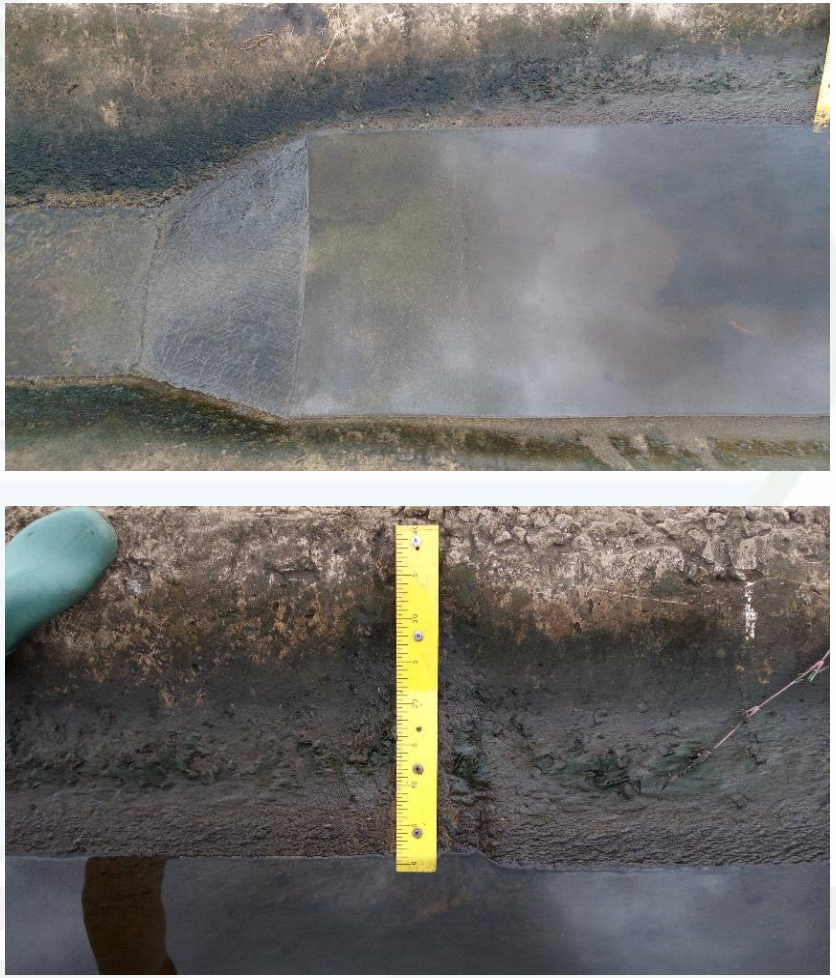

Fig.6: Flow measurement in the Canals.

Field interventions to improve water use efficiency in Uganda

Optimization of on-farm water management:

- Furrow discharge at optimal field parameters (efficiency, uniformity & adequacy) established for the different soil types;

- No. of furrows that can be irrigated simultaneously at a given field canal discharge determined;

Fig.7: Optimum water application assessment.

Results from water use efficiency improvement interventions

Infrastructure improvement:

- Tertiary canals efficiency increased to 90%;

- Field canals bed levels raised to allow for easy flow manipulation and water application to as many furrows as can be permitted at the optimal service level;

Fig.8: Improved Tertiary and Field Canals.

Results from water use efficiency improvement interventions

Water Accounting:

- Continuous flow data captured ;
- Rating curves generated to guide flow data collection;
- Rating curves from the Smart phone (iMoMo) data capture sites too were generated for comparison;

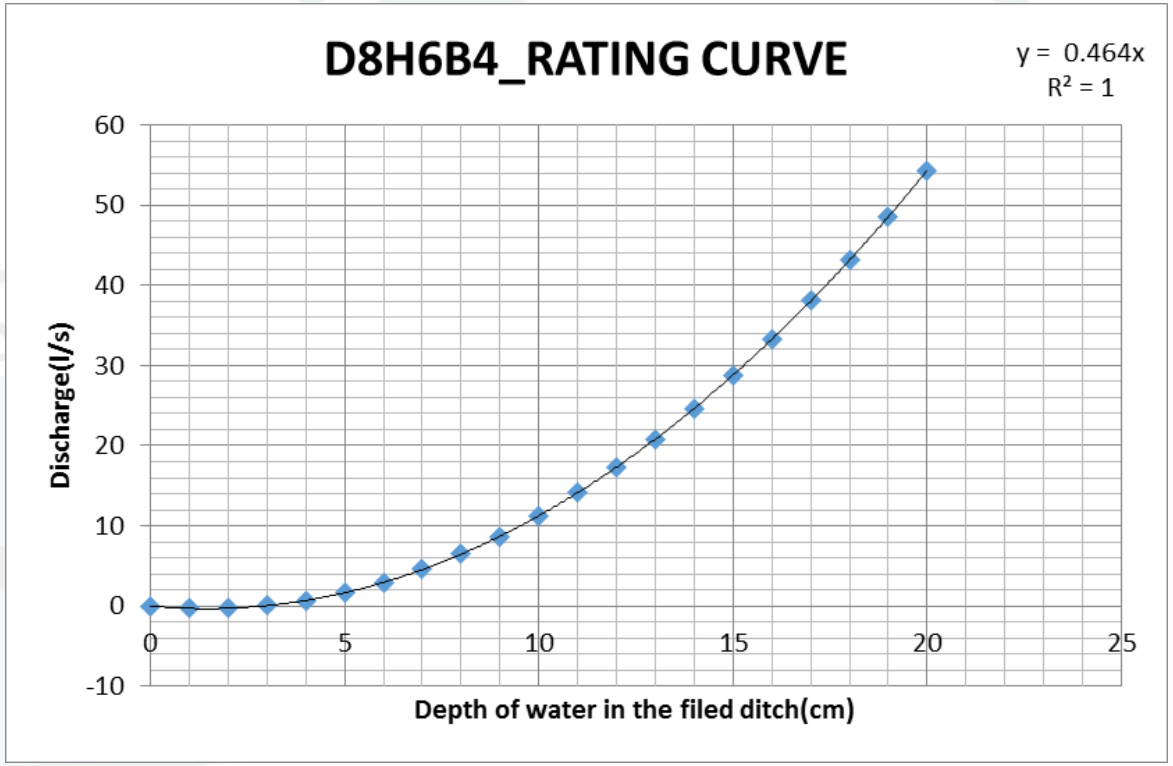

Fig.9: Rating generated for tertiary canal serving D8H6B4

Results from water use efficiency improvement interventions

Optimization of on-farm water management:

- Farms with loam soils registered high field application efficiency, distribution uniformity and adequacy at low furrow flows;

- Farms with sandy-clay-loam however registered high efficiency, uniformity and adequacy at high furrow flows;

Experimental Plot	D1b-H7-4		D12	
Soil characteristics	Loam		Sandy-clay-loam	
Furrow discharge (l/s)	0.75	0.38	0.75	0.25
Uniformity	0.95	0.91	0.86	0.69
Efficiency	0.63	0.90	0.44	0.37
Deep Percolation Ratio (DPR)	0.34	0.01	0.82	0.59
Tail Water Ratio (TWR)	0.02	0.08	-0.26	0.04
Adequacy	1.54	1.02	2.85	2.57

Table.1: Field water application performance parameters.

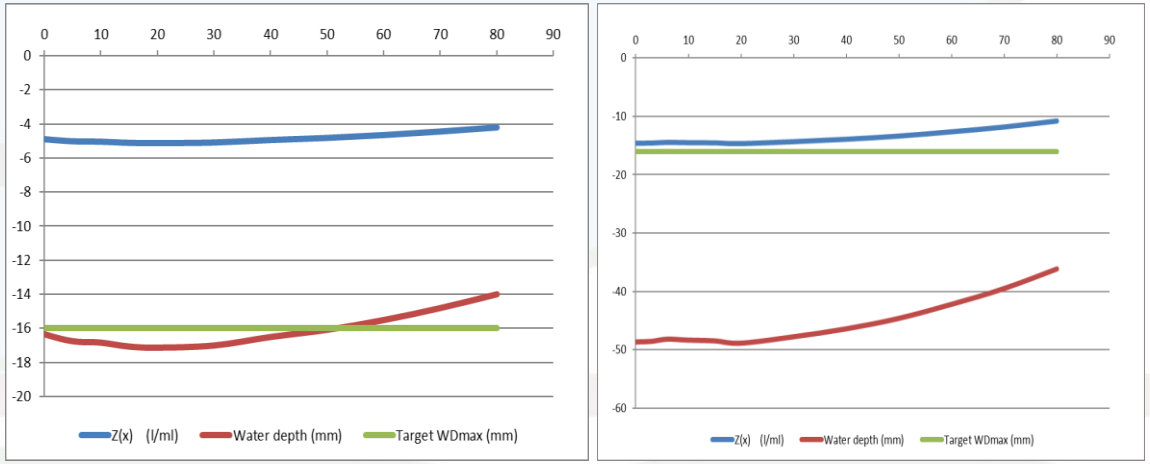

Fig.10: Water management levels for loam & sandy-clay-loam

Lessons learnt from efficiency improvement interventions

- Equity-sufficiency, transparency can be embraced and practiced where there is good and reliable flow measurements.

- Evidence based exposure of gaps and injustices in the existing irrigation schedule builds user confidence and attitude towards water saving.

- Enhancement of water productivity is intertwined with water use efficiency improvements.