

# Effects of in-situ rainwater harvesting techniques on run-off, soil loss, soil moisture status and maize performance in semi-arid of central Tanzania

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## Challenges & Study objective

- ✓ Land degradation resulting from severe soil erosion is a main cause of low crop productivity in semi arid of Central Tanzania.
- ✓ Drivers of soil erosion include poor tillage practices, overgrazing and deforestation among others.

**Main study objective:** To validate the effects of *in-situ* rainwater harvesting techniques and fanya juu/chini practices on surface runoff, soil loss, soil water storage and maize performance in Kongwa and Kiteto districts of Tanzania.

## Introduced technologies

During 2013/2014 – 2015/2016 cropping seasons, the followings technologies were validated in Kongwa and Kiteto districts:

- “Fanya juu” terracing reinforced with Napier grass and multipurpose tree (Figure 1).
- Two In-situ rainwater harvesting (IRWH) techniques: (a) Ox-tied ridging (b) Ox-ripping.

## Evidence

- In 2013/2014 – 2015/2016 cropping seasons, 30 soil erosion control groups have been formed and 265 fields across Kiteto and Kongwa districts were installed with “fanya juu” terraces.
- Returns are higher in ox-tied ridging and ox-ripping technologies (Table 1).
- Both ox-tied ridging and ox-ripping technologies have higher yield advantage of two to three folds more over conventional ox-plough tillage (Table 1).
- Ox-tied ridging is the most effective tillage method in the control of soil erosion (Table 1 & Figure 1).

## Approaches of taking the technologies to scale

- During 2015/2016 –2017/2018 cropping seasons, Africa RISING/NAFAKA partnership project scaled tied ridging technology to 744 farmers in Kiteto/Kongwa districts.
- Two lead farmers from Mlali village trained 123 farmers on use of “fanya juu” terracing in two villages of Kongwa district.
- 22 village extension officers in Kiteto and Kongwa districts received training on the use of ox-ridger and ripper tillage implements during 2013/2014 to 2016/2017 cropping season.



Figure 1: Multiple benefits of tied ridging (left hand photo) and “Fanya juu” terrace technologies (right hand photo) in semi-arid areas of Central Tanzania.

Table 1: Effects of IRWH technologies on environment, productivity and economic benefits in Kongwa district during 2013/2014 – 2015/2016 cropping seasons

Tillage method	Environment		Productivity	Economics
	Runoff, mm	Soil loss, t/ha	Maize grain yield, kg/ha	Gross Margin, \$
Conventional ox-plough	110	18.3	1202	15.1
Ox-ripping	73.4	12.6	2235	209.4
Ox-tied ridging	25.6	2.2	3117	313.6

## Proposals for the future

### Research

- Evaluate the long term effects of residual tied ridging on all Sustainable Intensification domains.
- Explore factors influencing social domain on the uptake of IRWH and Fanya juu terracing technologies.
- Explore the effects of integrating cereal, legume and IRWH on control of soil erosion.

### Scaling

- Enhance the linkage between village extension officers and champion farmers.
- Engage with new development partners.

## Partners