Rainwater harvesting systems for ntula/eggplant (Solanum aethiopicum L.) growing in Uganda

SUMMARY:

This technology describes utilizing rooftop water harvesting facilities to increase the availability of water for domestic use and irrigation of backyard ntula/ eggplant (Solanum aethiopicum L.) gardens.
This measure allows small-scale farmers to harvest rainwater from roofs and store it in tanks, ensuring ntula production also during the dry season, when it would be otherwise impossible.
The combination of rainwater harvesting with other good practices (e.g. staking, mulching, manuring) help increase productivity while reducing soil erosion, eventually strengthening the resilience of farmers to the impact of dry spells.

KEYWORDS:
Disaster prevention [1]
Drought [2]
Rainwater [3]
Harvesting [4]
eggplant [5]

CATEGORY:
Crop production [6]

COUNTRIES:
Uganda

DESCRIPTION:

1. Suitability

This measure was tested by households in rural districts in Uganda that face frequent water shortages. Rain water harvested in tanks can be used for domestic purposes and to water ntula (solanum aethiopicum L.) gardens as they need only little water to produce decent yields. If harvested water is managed carefully, it can be a reliable and significant water source during the dry season. Housing with iron roof would have an advantage in installing the water harvesting tanks as it facilitates the collection of rain water.

2. Composition and types of tank

Rainwater can be harvested from roofs by building gutters that guide the water into a harvesting tank (Fig. 1, tank 1).

Water can also be harvested by putting inclined iron sheets directly on the tanks, in addition to the roofs (Fig. 1, tank 2). The water is then accessed with an electronic pump (Fig. 2).

Several sizes of tanks were observed in the field, such as: 7,000L (tank 1); 30,000L (tank 2); and 50,000L (Fig. 1, tank 3). Tank size depends on needs, investment capacity of the farmer/community and size of dwelling (For instance, medium sized tanks may be suitable for a dwelling that have a roof size greater than 25m2).

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Fig. 1: Different types of tanks for rainwater harvesting

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Fig. 2: Treadle pump to access water from tank

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Fig. 3: Rooftop rainwater harvesting with gutter and tank

3. Major costs

At the point of writing the cost for establishing a tank system for rainwater harvest were as follows:

- 7,000L tank (Fig 1., tank 1) = 2.3 million UGX
- 30,000L tank with inclined iron sheet (Fig. 1, tank 2) = 3.5 million UGX
- 50,000L tank (Fig.1, tank 3) = 4 million UGX
- Treadle pump (Fig. 2): 60,000 UGX

4. Effectiveness and benefits

4.1. Socio-economic and ecological benefits

4.1.1. Short-term benefits

- Saving time: water harvesting tanks give people easy access to water for domestic use and prevent them from walking long distances or waiting in line to get water from boreholes everyday.
- Saving labor: instead of getting water, people will be available to do other tasks, for example working in the fields or going to school.
- Additional income: water from the tanks can be sold at 1,000 UGX/jerry can

4.1.2. Medium term benefits

- Additional source of good quality water when other sources farmers usually take the water from are polluted or depleted

4.1.3. Long term benefits

- Prevent water depletion from natural sources (groundwater, lakes, streams, swamp, etc.)
- Decrease erosion from surface run-off induced by heavy rains

4.2. Gender related benefits

- Women are usually the ones responsible for harvesting water. Rain water harvesting techniques allow women to save time that can be used instead to produce food and/or going to school. Rain water harvesting can therefore have significant benefits for women and contribute to gender equality.

4.3. Climate Change Adaptation related benefits

- Rain water harvesting saves time and labor, provides an additional good source of water, helps to reduce erosion from heavy rains and limits water resources depletion, which is particularly important in a context of climate change where water resources are likely to become scarcer. Rain water harvesting therefore offers opportunities to better adapt to climate change.

5. Side Effects

Water harvesting tanks can have some negative side effects. If they are poorly constructed, the tanks can suffer from algae growth and pest invasion. They can also become a breeding ground for disease vectors if not properly maintained.

6. Major Barriers

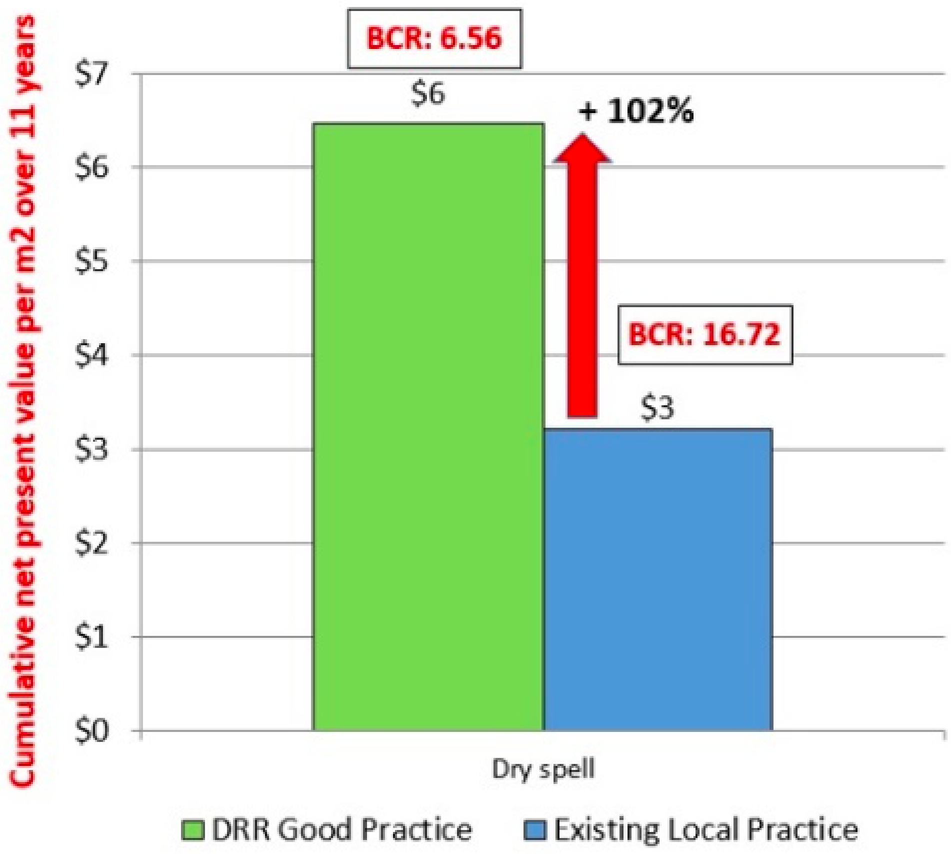
There are usually no cultural or social barriers against water harvesting tanks. However, very often communities face financial challenges to buy the tanks and sometimes technical challenges to build the related harvesting infrastructure.

7. Synergies

Rain water harvesting can create synergies with other adaptation options such as:

- Low cost drip irrigation systems
- Valley dams
- Water harvesting rock embankment
- Use of mulch and compost to increase water retention capacity of the soil and reduce evaporation

8. Cumulative Net Benefits and Benefit Cost Ratios of Good Practice and Local Practice



[10]

($ per m2 per year)

Cost-Benefit Analyses were conducted based on quantitative data collected during the monitoring period in the 2016 dry season (Jun-Aug). Cumulative net benefits and benefit-cost ratios were calculated over 11 years per square meter of ntula eggplant (solanum aethiopicum L.) garden. Data collected from good practice plots were compared with data collected from local practice plots where no rainwater harvesting facilities were installed.

For good practice plots, the gross value of production is calculated considering that farms produce ntula eggplant (solanum aethiopicum L.) throughout the year (except for the first year when the first six months are dedicated to install the rainwater harvesting facility), while in local practice plots production is only possible during rainy seasons (6 months per year).

The above graphs show that, in dry spell conditions, growing ntula eggplant (solanum aethiopicum L.) with rainwater harvesting brings returns 102% higher than under local practice. However, benefit-cost ratio is higher under local practice than good practice. This is due to the higher capital and running cost involved in the implementation of the good practice, such as additional labor and capital cost of purchasing rainwater harvesting facility and water pump.

Access to credit is key to ensure that farmers are able to invest in this good practice.

Given the small size of the sample analyzed, additional research would be needed to confirm results.

9. Minimum requirements for successful implementation of the technology

- Inclined roof, preferably of iron
- Ground space near the roof (approximately 6.5 m2 of space is needed to install a 7,000L tank)
- Initial financial investment to install the rainwater harvesting system (approximately 0.75 USD per m2 of plot)

The costs mentioned in this technology refer to the time of writing and the specific geographical location.

FURTHER READING:

- Food and Agriculture Organization of the United Nations. Project Document: Global Climate Change Alliance (GCCA) ? Uganda: Agriculture Adaptation to Climate Change. Republic of Uganda. 2012. 44p.

- Water Aid. 2013. Technical Brief: Rainwater Harvesting.

SOURCE(S):

FAO Strategic Objective 5 ? Resilience, in FAO [11]

Country:
Italy

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Links:
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