

Improving Irrigation Practices in School Gardens in Kamuli District, Uganda

Ellen Osterhaus¹, Global Resource Systems, Kerri Carlton¹, Global Resource Systems, Ogwang Boby², Crop Science, and Mayanja Ishmael², Agricultural Engineering

¹Iowa State University, Ames, Iowa, USA ²Makerere University, Kampala, Uganda

Introduction

People in the Kamuli district of Uganda use rudimentary methods for irrigation. These methods, primarily the use of watering cans, are labor intensive, time intensive, and water inefficient. To improve these methods, the Iowa State University – Uganda Program Irrigation Team implemented experiments with mulching and sprinkler systems to investigate how irrigation can be made more efficient in this area. 1) A mulching experiment analyzed the effect mulch type on plant height. 2) A sprinkler system was used to measure the infiltration of water in the soil.



Fig 1. Eggplant with rice straw mulch, watering can, and cup used for watering



Fig 2. Sprinkler in a sweet potato field at Namasagali primary school

Results

- Plant growth varied with mulch use.
 - Grass mulch had the best growth followed by banana leaf mulch. (Fig 3)
 - Plants grew larger and had more leaves with grass mulch.
 - Grass also brought termites and destroyed the mulch.
 - Pupils gained experience with the scientific methods and controlled variables.
- The longer the sprinklers are run and the more sprinkler heads that are used, the greater the moisture infiltration into the soil.
 - Moisture depth in soil decreased farther away from the sprinkler head.
 - Educated Youth Entrepreneurship Club about sprinkler operation and benefits (Figure 6)
 - Two sprinkler heads provided more water permeation in the soil than one.

Materials and Methods

- 127 eggplants were planted, watered, and measured using a control device (Figure 1)
 - Plants were mulched using grass clippings, banana leaves, rice straw, and mango leaves in a repeating pattern (Figure 5)
 - Plant height and number of leaves were measured twice a week for two weeks.
 - Five times a week the plants were each given two cups of water from a borehole.
- Sprinkler materials: hose, gas pump, sprinkler heads, connecting straps, timer
 - Using two sprinkler heads, the system was run for two fifteen minute intervals, for a total of thirty minutes
 - Soil moisture depth readings were taken at varying distances away from the sprinkler after watering
 - Trials were conducted at Namasagali college (Figure 4) and Namasagali primary school (Figure 2)

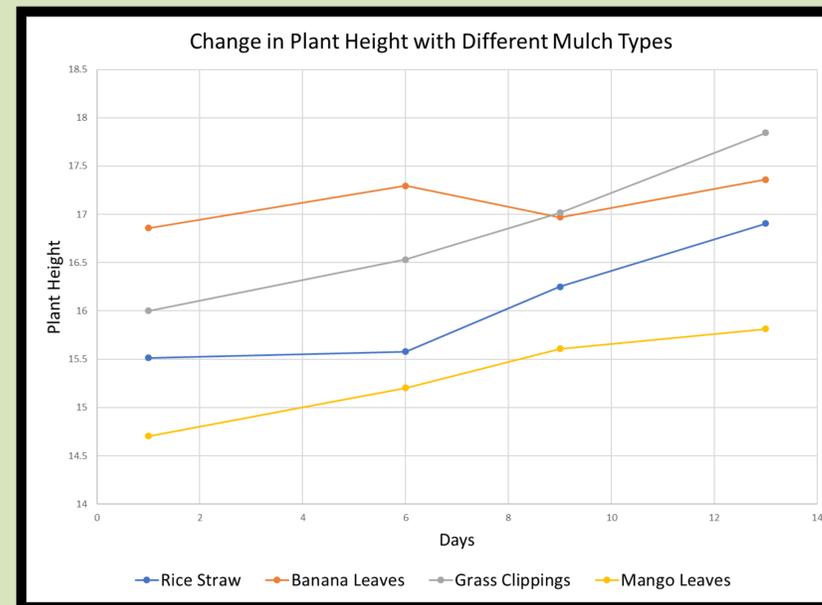


Fig 3. Graph of plant growth over time using the different mulch types.

Conclusions and Recommendations

- Kamuli residents would benefit using grass mulch.
 - Grass mulch is an effective treatment to make irrigation more efficient.
 - Grass mulch may not be suited for long term use due to termite damage.
 - Mango leaf mulch should be used in areas with lots of termites.
 - Experiments should be run for longer to ensure consistent results.
- New sprinkler equipment would be beneficial to this community.
 - Sturdier sprinkler heads will increase irrigation efficiency and reduce risk of breakage.
 - A hose storing system would prolong the life of the hoses.
 - Youth Entrepreneurship Club should take responsibility for sprinkler use.



Fig 4. Sprinkler system at Namasagali college



Fig 5. Setup of mulching experiment at Namasagali primary school



Fig 6. Sprinkler at Namasagali college with Youth Entrepreneurship Club

Acknowledgements: College of Agriculture and Life Sciences, Center for Sustainable Rural Livelihoods and Iowa State University – Uganda Program and donors, including: Jerry and Karen Kolschowsky and the Kolschowsky Family and Foundation; Rose Boughton; Tom and Terri Miller