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**Preliminary Study on Effect of Waterboxx on Survival Rate of Fruit
Trees (Apple , Avocado, Gouva and Orange) at Selame Elementary
School Garden Wukro, Tigray North Ethiopia**

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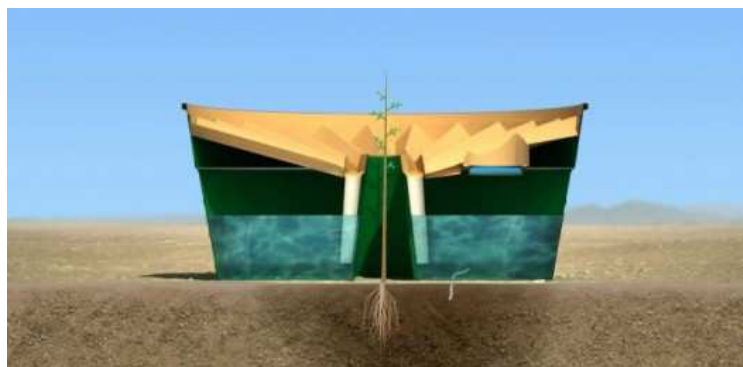
**Preliminary Study on Effect of Waterboxx on Survival Rate of Fruit Trees (Apple ,
Avocado, Gouva and Orange) at Selame Elementary School Garden Wukro,
Tigray North Ethiopia**

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Introduction

Fruit plays a significant role in human health. It provides antioxidants, vitamin A; C and E that are important in neutralizing free radicals these cause cancer, heart disease, hypertension, stroke and diabetes [1]. However, production of fruits were faced many challenges. Irrigation water in dryland is the main problem to produce fruits in drought. Tigray is known for its arid environment with water scarcity which is the main constraint in fruit production. Wukro Kilte Awulaelo district which is found in Eastern part of Tigray also faced similar problem. Wukro Kilte Awulaelo is located 41.5 km far from Mekelle the capital city of Tigray. The altitude of Wukro town is 1972 meters above sea level, and received 450 – 600 mm average rainfall in a year. The agro ecological condition of Wukro Kilte Awulaelo district is mainly woina dega and has only one rainy season which is the kiremti period. [2]

Even though, there is water shortage problem to get average fruit yield there is solution for this challenge, and the shortage of water or high evaporative demand of dry temperatures which are too dry for trees to survive was improved by using Waterboxx. The waterboxx is a polypropylene bucket with a lid. It has a vertical tunnel in the middle for two plants. A wick allows water from inside the box to trickle into the ground via capillary action [2]



Source:URL[3]

Waterboxx is a sustainable and effective solution for planting trees in arid environments and lead to greater water conservation. Its main goal is to protect trees during their first year of growth, when they are most vulnerable. The Waterboxx's design ensures minimal evaporation

during the heat of the day, and creates condensation at night due to changes in temperature. The sloped cover of the box also allows for the capture of rainwater. [2]. Waterboxx allows the collected water to drip periodically into the soil, promoting the development of a capillary water column that encourages the roots to continue to search for water deep in the ground. Fights competitive weeds near the planted tree; and can even prevent damage by rodents. Generally, the Waterboxx stimulates optimal growth of the young tree. Despite this the waterboxx can also use to plant vegetables on very dry places or during draughts [5].

Based on this background of the waterboxx preliminary study were conducted to evaluate the effect on different fruit tree types at Selam elementary school Wukro to share the experience with their friends in El Verano School in USA

General objective

- To improve fruits and vegetables production in dry land areas of the region
- To improve food and nutrition security

Specific objective:

- ✓ To evaluate the purpose of the material under the management of elementary school students
- ✓ To improve nutritional intake of resource poor families by growing fruit trees

Materials and Methods

The study was conducted at Wukro Selame elementary school, in collaboration with grade six students assuming that, these students were stay three years in the campus till they finalize their eighth grade. Total number of students participated in the study were fifty; 20% of them were girls and 80% boys. In addition to this, ten students these having economic problem (affected by low access to fruits) were selected from the total number to plant fruits at their home.

Technical training was provided, regarding importance and production of fruits, purpose and technical application of water box, by Mekelle agricultural Research center fruit researchers.

Four types of fruit trees; Apple, Avocado, Guava and Orange; ten, six, nine and nine plants respectively were planted with water box at Selame elementary school field. The seedlings were obtained from St. Merry Technical and vocational agricultural collage. Three students were assigned to one plant.

Only Guava was used at the student's house one plant with water boxx and one without waterboxx. The seedlings were obtained from Bureau of Agriculture and rural development fruit nursery.

Data were collected number of survived plant and plant height after eight months of planting. Results were compared with avocado plants planted in the school in July 2013. And analysis of results was computed difference in height and the survival rate of each fruit type.

The water box is refill when the container was below the seated level. The students refill every week or every two week depending type of the fruit and weather condition.

Results and Discussion

Hundred percent survivals were observed on Apple, Orange, and Guava but avocado was survived 84% percent. The preliminary study were almost similar with the study conducted by Mohamed Premier University in morocco for three years, 90% of the plants planted with water boxx were survived but only10.5% of plants planted without water box were survived[4].

The average height of Apple was 45.2 cm with range of 38-62 cm difference, Avocado average height in cm was 51 ranging from 27-65 cm ,orange 85 cm with range of 70-100 cm and Guava average values 82 cm and range was 57 -114cm (Fig.1)

Apple fruit tree



Avocado fruit tree



Guava fruit tree



Orange fruit tree



Avocado plants planted without water boxx in July 2013 the average height of eight plants were 46 cm with 35-57 cm range.

Guava plants planted at student's house were initially having short heights. Only two plants (20%) with average height of 29cm were survived, however, 100% survival and having the average height was 40cm for all plants at every house.

Conclusion and recommendation

It has been proven that the wukro climate is suitable for the survival of trees that have been planted with waterboxx.

Water box have positive impact in survival rate and height of the fruits

Conserves water by eliminating evaporation

It is necessary to use water box in areas having water shortage and in the bench terraces constructed every year and distributed to youth farmers for fruit plantation.

The waterboxx technology is a way to plant trees and bushes in a sustainable manner

The result is reflected in the growth rate height of the trees

The Waterboxx was taken off after eight months, because it was a fast growth of stem that doesn't allow taking the box off if you wait longer.

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