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Omo Zone, Ethiopia: Moringa tree as a realistic solution to child malnutrition

Child malnutrition in Ethiopia nowadays is known as one of the leading causes of death, more than 38% of children suffer from malnutrition in addition to all the problems of sanitation, hygiene and water in which they live (OzturkYagmur , 2020), besides the fact that Ethiopia is categorized as the country with the most cases of malnutrition in children (World Health Organization, 2020). The concept of malnutrition refers to all those imbalances in the consumption of nutrients, within malnutrition there are two important categories: Undernutrition and overweight, the first refers to growth retardation and lack of nutrients in the body and the second talks about obesity problems and later about cardiovascular problems (Silva Patricia, 2005). But then, why is it important to take care of the children's diet? Well, to start, children with a poor diet are more likely to get cardio-respiratory disease, poor muscle function, gastrointestinal function problems, immunity and even psychosocial problems (Saunders John and Trevor Smith, 2010).

Due to a study carried out by Negasa Eshete Soboska in late 2018 and early 2019 in which some areas of Ethiopia, including Omo, were studied to see the nutritional status of children. At first they randomly selected 378 children to which later they did certain studies based on WHO measurements such as weight, length, height and even the circumference of their arms. The results were surprising knowing that 95% of children had problems with breastfeeding, diarrhea, poor housing and homes, critical handwashing, open pit latrines for defecation and problems with purified water, as a conclusion it means that 95% of the children in the study had malnutrition problems (Negasa E et al, 2021).

The Omo Zone in Ethiopia is a valley located in the south west region on the border with Kenya, Sudan, Keffa and Konta. Most of Omo is made up of ethnic groups and nomadic groups that due to their lifestyle away from society have been considered as an almost non-existent nation and a weak society, these problems of low population have as a consequence a low basic infrastructure such as they are the telecommunications systems, educational centers, electrical centers, water and food distribution, waste management and financial institutions. Finally, the areas of western Omo are the parts with the least population in all Ethiopia (Dr. Yusuf Farah Ahmed with contributions from H Admassu , 2009).

This area has a sunny, dry, desertic and generally warm climate. Omo is a valley recognized mainly for its great production of coffee, even representing 1.36% of coffee produced in the entire country of Ethiopia. Omo has an estimated 573,435 people throughout, of whom 286,607 are men and 286,828 are women. The religious beliefs of the Omo people are based on Ethiopian Orthodox Christianity and Muslims. From the urbanization in the Omo area we can see that there are a total of 125 388 houses and that on average 5 people live per house, but outside the urban areas there are tribes such as the Tsamai, Amhara, Samai, Hammer, among others. According to Dr. Yusuf Farah Ahmed we can conclude that Omo is a very poor area and without security since only 4% of the population of Omo has access to electricity, 11.5% of the population has a job outside the field, only 37.7 % of children are enrolled in the education system and more than 77% are in constant danger of malaria (Dr. Yusuf Farah Ahmed with contributions from H Admassu , 2009). Sadly, Ethiopia in general is one of the

poorest countries due to the civil war and its 3 decades of duration, the problems that it left as agricultural production, shortage of all resources, the abandonment of citizens and the death of so much population are main causes of poverty. Today Ethiopia is suffering from a new war known as the Tigray war which, like the past one, has serious consequences for the inhabitants (Iniseg, 2020).

Within the culture of the Omo Valley there are 8 ethnic tribes. As a general characteristic of all the tribes, the majority of inhabitants decorate their bodies with scarifications and paintings, just as their way of life has been the same for a long time. As the first tribe we find the Dorze, this is a community that lives from livestock and agriculture, they are dedicated to the elaboration of cotton robes, and it is also customary for women to spin and for men to weave. The Hamar tribe live by herding and farming, they have intricate hairstyles made from red mud and animal fats, and they wear scarifications. This tribe has as an initiation rite the bull jump or in their language Ukuli Bula and the young people must do it naked, jumping around 30 cows. The people of the Dassanech tribe are mainly dedicated to nomadic herding, they live on the banks of the Omo River, they only work on crops in the rainy season and their diet is based on the consumption of corn and sorghum. Then we have the Karo tribe, this tribe is located at the top of the Omo river, its people work in the collection of honey, agriculture and livestock. The Mursi live in the Mago National Park, this is one of the most famous tribes in the region since women have a tradition of placing large plates on their lower lip. They are a hunting tribe and keep their livestock. Another tribe which is dedicated to grazing cows, goats and sheep is the Banna tribe, their crops are sesame and sorghum. One of the friendliest tribes are the Ari, they are dedicated to the work of ceramics, alcohol distillery, blacksmithing and injera preparation. Finally, the Borana tribe that is located in the Yabello region, the majority of people in this tribe are Muslims and the rest are Christians, their work is based on the construction of water wells and grazing (My Lifetime Journey, 2022).

The main challenge is to nurture and feed the children of the Omo area in Ethiopia to give them a better lifestyle, a better quality of life and reduce the mortality rate within the area. But then how can all this be done with a low budget and in large quantities? Well there is a tropical plant called in a thousand different ways like the pearl tree, mom's best friend, tree of good and even tree of life. But in reality it is called *Moringa oleifera*, it is a very easy tree to grow since the only conditions that the plant needs to grow are: a location where it receives sun most of the day, a land and soil that they need should not be very exotic since *Moringa* manages to adapt to most soils and even to poor soils, the only soils that are not recommended are sandy soils because if it keeps a lot of moisture or is very compact, the seeds will rot. About the watering of the soil of the plant we can say that although the soil of the plant needs constant watering it should not be completely wet, these plants do not tolerate excess water unless the root is flooded, and it is even more likely that *Moringa* survives a drought than a flood. But in the case of watering the seed and the plant, it is more advisable to give infrequent waterings, once a week and consistent watering, although not enough to drown the plant, in case it rains there would be no need to water. In the case of temperature and humidity, *Moringa* needs an approximate of 77 °F to 95 °F (25 °C to 35 °C) and even manages to live with higher temperatures but with the condition that the light is not direct. and so do not suffer burns. The cold is not fatal for *Moringa* but it is not highly recommended to plant them in cold places and it is more advisable to plant them outdoors. To grow *Moringa* it is not necessary to use fertilizer but it is not bad to add fertilizer and it has also been observed that putting compost for the soil helps growth, (Cori Sears, 2021). It should also be noted that with the appropriate conditions this tree manages to grow and produce the first fruits in the first 6 to 12 months (Paniagua, 2016)

	Calcium	Magnesium	Phosphorus	Potassium	Iron	Oxalic acid
mg						
Fresh Leaves	440	24	70	259	0.7	101
Leaf Powder	2003	368	204	1324	28.2	1.60

Table 1. Nutrients in moringa (Data extracted from table 1 in Fuglie, 1999)

	Vitamine A	Vitamine B	Vitamine B1	Vitamine B2	Vitamine B3
mg					
Fresh Leaves	6.8	423	0.21	0.05	0.8
Leaf Powder	16.3	-	2.64	20.5	8.2

Table 2. Nutrients in moringa(Data extracted from table 1 in Fuglie, 1999))

	Protein	Fat	Minerals	Fiber	Carbohydrate
g					
Fresh Leaves	6.7	1.7	2.3	0.9	13.4
Leaf Powder	27.1	2.3	-	19.2	38.2

Table 3. Nutrients in moringa (Data extracted from table 1 in Fuglie, 1999)

Calories	
Kcal	
Fresh Leaves	92
Leaf Powder	205

Table 4. Calories in moringa (Data extracted from table 1 in Fuglie, 1999)

The health benefits are: Protection for bacteria in which the study of "Antimicrobial activity of *Moringa oleifera* from different locations against some human pathogens" demonstrates the antimicrobial potential of Moringa, inhibits the growth of *Pseudomonas*, *Aeruginosa* and *Staphylococcus* which is a mucosal bacterium (Cáceres et al., 1991). The main component of moringa that helps against this is benzyl isothiocyanate which helps against pathogenic species such as *Staphylococcus*, *Streptococcus* and *Legionella*. In addition, it was also found that Moringa has antibacterial effects against *Escherichia coli*, *Salmonella*, *Pseudomonas aeruginosa*, *Vibrio parahaemolyticus* and *Aeromonas Caviae* (Grosvenor et al., 1995; Kudi et al. al., 1999, Awadh et al., 2001). Protects the liver against the damage that some medications or drugs can cause, serves as a

treatment for eating disorders, helps treat asthma because it protects against constructions in the bronchi and improves the respiratory system. Regarding diabetes, moringa helps reduce the amount of glucose in the blood and improves hemoglobin and protein levels (Rose Wilson Debra, 2020). Helps wounds heal faster, reduces high blood pressure with the properties of potassium, protects the skin and offers a treatment of edema moreover to being containing non-harmful cholesterol (Cadman Bethany, 2020). It also helps with anemia which is a disease caused by a lack of red blood cells which transport oxygen throughout the body and distribute it in the tissues.. From a demographic study carried out by Nebyu Daniel Amaha from 2011 to 2016, it was possible to analyze that anemia increased by 28.7% in children under 5 years of age in Ethiopia. Therefore, anemia can be treated with the consumption of iron, vitamin B and all kinds of supplements, and this is why Moringa is a perfect solution to treat malnutrition and anemia in children since it has 28 2 mg of iron for each 100g and 423 mg of vitamin B per 100g (Daniel Amaha Nebyu, 2020). In addition to all the advantages already mentioned according to Paniagua, the oil that is released from the seeds can be used for food with ben oil properties, also as fuel, biofuel and the seeds can be used to filter the water.

The solution is to plant Moringa seeds in the Omo area with a sustainable irrigation system that mainly supports recycling. Omo is a perfect area to plant this tree due to its temperature, humidity and all its climatological characteristics, with the collaborative and voluntary work offered by the Productive Protection Network Program (PSNP), the Voluntary Resettlement Program and the Complementary Community Investment Program (CCI) (MINISTRY OF LABOUR AND SOCIAL AFFAIRS, 2012), volunteers will be organized and distributed within a hectare of land to plant 30 seeds per 100 square meters in one day as we can see in “Figure 1.”.

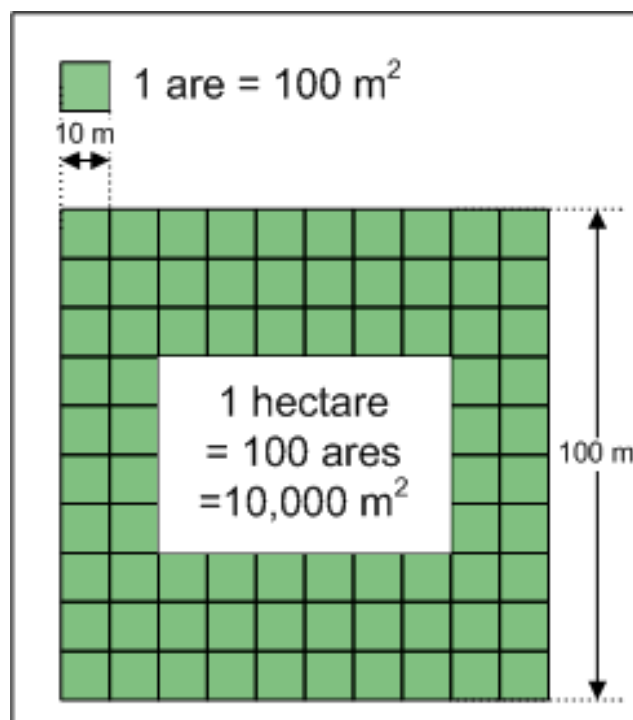


Figure 1. Representation of a hectare and its areas divided into squares of 100 square meters (Martinvl, 2010)

The hectares are a very important element in the process of this project since without the land of the soil it will not be possible to grow or plant the moringa, it is also important to keep a count and record of the area in which it has been planted in order to know the possibilities of growth and the approximate time in which the crop will begin to be used.

The moringa tree has a lifespan of 20 years in which the tree can measure from 5 to 10 meters, but in 6 months it could reach 4 meters, the fruits capsule measure from 20 to 40 cm, in addition each tree produces from 20 to 120 capsules and approximately each fruit capsule contains 12 to 15 seeds which are produced after the 3rd month of flowering, whereby one year it can produce 15 000 to 25 000 seeds. The stem has a diameter of 20 to 30 cm, the leaves measure from 0.4 to 2 cm and the flower from 10 to 20 cm (Agrotendencia, 2008).

The irrigation system is sustainable since plastic bottles are used, the way this system works is to fill it up to half with water from the Chamo lake and Hawassa lake and they will proceed to make holes at the top of the bottle, after this a small hole should be dug where the bottles with water are introduced, letting the water fall and watering the nearby land without letting the seeds drown from so much water, this will proceed to do every week in case the rain comes it will not be necessary to water them. Each bottle must be replaced after a period of two years since according to The U.S. Food and Drug Administration (FDA) that are in charge of the bottled water industry, it is most recommended to dispose of the bottles and their use due to wear and tear (BlueTriton, 2022). The benefits of a bottle-based irrigation system is that almost 100% of the water is used and there is no runoff, it is an automatic system and can be controlled so that it stops working at any time by simply removing the bottle and turning it over. It is suitable, I mean that it can not only be placed under the ground if it is necessary at some point the bottles can be accommodated in a different area for example on a stick on the top of the ground for a different type of irrigation, it is possible to avoid weeds since the water enters only towards the directed place and it is more probable that the furrows are avoided and finally the pests in the leaves are avoided and it does not allow the growth of fungi in these if it is directed and the dropper gives a correct outlet of the water (Roa Yelis, 2019). Chamo lake and Hawassa lake are two of the most important places for this project within the Omo area since it is planned that the plantations will be near these bodies of water, Lake Chamo is in the south of Ethiopia, it has an altitude of 1110 meters, also the lake is 32 kilometers long and 13 kilometers wide, the maximum depth in this lake is 14 meters, the formation of this lake is due to the union of other rivers such as the Kulfo and more streams (Seleshi Bekele Awulachew et al., 2007). Lake Hawassa is 16 kilometers long and 9 kilometers wide, its maximum depth reaches 10 meters but it also has an area of 129 square kilometers (hmgong, 2006).

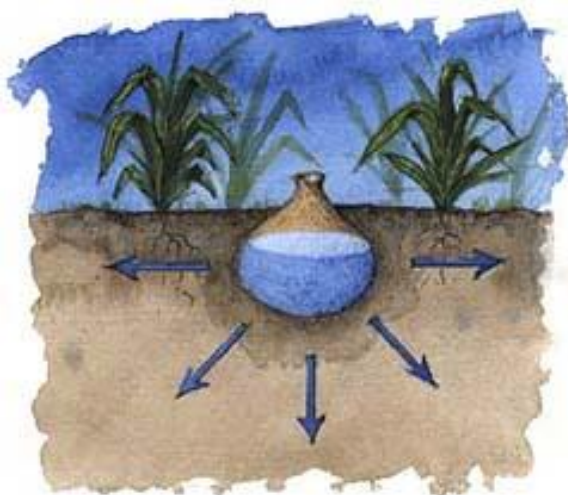


Figure 2. Ancient method of irrigation similar to irrigation with plastic bottles (FAO, 1997).



Figure 3. Plastic bottles as a drip irrigation system.(Valenteshop, 2020).

According to the Professor of nutrition and food science Ana Troncoso there is no health safety problem in the recycling and reuse of plastic bottles as long as they do not contain polycarbonate-based substances such as Bisphenol A, which in constant use can release their toxic particles and even Through a study carried out at the Prevention Control Center in the United States, the results indicated that a percentage greater than 90% of the inhabitants had traces of this substance in their urine (BBC mundo, 2015).

In 2020 a three-year partnership was launched in Ethiopia by The World Food Programme (WFP) and The United Children's Fund (UNICEF) to give support and protection to the government of Ethiopia with the aim of preventing malnutrition in children and mothers, along with this, it also bring projects and support to community services to provide the best possible nutrition (World Food Programme, 2020). Along with this campaign a financial aid of \$50 USD per hectare could be requested since this money manages to buy 1 Kg of moringa seeds equivalent to 3000 seeds for each Kg (Padilla C., Fraga Nidia y Suárez M., 2012). In relation to financial and money issues it will be required for help from our volunteers from the Productive Protection Network Program (PSNP), the Voluntary Resettlement Program and the Complementary Community Investment Program (CCI) a collection of plastic bottles most recommended from the "Forest Water" brand, since it is the main brand of water sold in Ethiopia (Forest Water, 2020).



Figure 4. Forest Water bottles from Ethiopia (Forest Water, 2020).

To take full advantage of the capacity of moringa leaves we can use cooking recipes such as: Creamy Lentil Soup, Onion Soup, Kale, Chickpeas and Chicken in which the leaves must be cooked or boiled depending on the food and later added to the food, the cut pods can also be added to any type of soup, stew, etc. The taste of moringa is more pleasant when the food is spicy, as in South Indian Sambar and Thai kaeng Som and Moringa leaf Korma which are spicy soups that have moringa as the main ingredient (CookingLight, 2018). In this way, moringa could be implemented in children's daily food, providing a high nutritional level.

This project will be accepted by Ethiopian society thanks to the IFAD program, which in recent years has helped Ethiopia with 21 projects, a total financing from IFAD of \$829 83 million USD, a total

project cost of \$2 444 63 million USD, and which also has an impact on 11 578 750 households. One of IFAD's main strategies is a loan program for farmers and agropastoralists with the intention of offering sufficient means to increase their production. I mainly believe that IFAD's collaboration is very important because its investments are granted to the parts of Ethiopia in which there are fewer resources and there is a higher dietary risk (FIDA, 2022). Moringa tree plantations will be well accepted in the Omo region as well as its population since economic support is always for the benefit of society, in addition to the fact that the population of Omo knows moringa well and is part of one of the most important crops in Ethiopia, but it will also be included as an ingredient in the traditional recipes of the area such as shiro, injera and dabo (exoticca, 2013).

To convince and explain to the inhabitants of Omo that this project is for their benefit, I would send a volunteer from the Productive Protection Network Program (PSNP), the Voluntary Resettlement Program and the Complementary Community Investment Program (CCI) who will be in charge of giving an explanation of the benefits of Moringa towards the health of each inhabitant, the problems that exist in their population and the reason why moringa it's a good solution. Also the volunteer would explain the processes and request the support of local agronomists to increase the planting of this resource (MINISTRY OF LABOUR AND SOCIAL AFFAIRS, 2012). For the transportation of the seeds to the cultivation area, the collaboration of the volunteers in their work area will be needed so that, together with the financial collaboration of The World Food Program (WFP) and The United Children's Fund (UNICEF), the seeds can be collected at an agreed meeting point and in this way be transported by volunteers to the planting area.

For the distribution of trees in the planning within the geographical area, a seed should be planted every 40 cm along with its sustainable irrigation system, until the hectare of agricultural land is filled near the lakes and areas recommended by the population. On the other hand, the distribution among the population would be with the 8 tribes and mainly the food will be distributed to households with children with signs of suffering from some nutritional problem, indications will be given in recipes with moringa and they will also be able to make free use of it. product as long as it is included in the daily diet of minors. According to Yguá Moringa, the recommended amount of moringa that should be consumed daily is 3 grams to 5 grams, but in case of a higher oxidation state, the amount of moringa can rise to 9 grams daily, therefore it is calculated that per child 300 grams of the product per month and in this way the distribution will be enough for a month (Yguá Moringa, 2020).

To set up this project I have elaborated this table to give organization to the crops:

Step 1	Talk to volunteers and propose the project to organizations in charge of financial and labor support.
Step 2	Once the project is approved, a team of volunteers will be sent to the Omo Valley to give talks and explanations about the project and seek the support of the communities to start the plantations.
Step 3	Ask the community for unused farming areas with the necessary characteristics near the Hawassa and Chamo lakes.
Step 4	The volunteers began to collect bottles of the Forest brand and they should be stored until they obtain 3,000 bottles for each hectare.
Step 5	The financial support gives us the money or will take care of obtaining the seeds, in any

	of the cases we must agree on a meeting point for the collection of the seeds or the money.
Step 6	The seeds will be transferred by the volunteers to the cultivation areas and there the plant specialists will begin to give instructions to all the volunteers about how to plant them and their treatment.
Step 7	Plantations are started with the sustainable irrigation method and a count and record of each plant will be kept.
Step 8	At the end there should be a meeting in which the agronomists talk with the volunteers to check the progress, the growth and above all not to neglect the treatment for the plants.
Step 9	When seeing that the plants begin to bear fruit and that the growth time has passed, the volunteers will be called for their collection.
Step 10	After harvesting, some seeds will be replanted and the cycle of plantations will continue.
Step 11	For distribution in tribes, volunteers will be sent to the markets, public living areas, ethnic areas and the necessary amount of the product will be granted.

Table 5. Initial steps to set up the project.

To conclude, as we already know, Omo is a very neglected area and as demographic data indicates, cases of malnutrition are alarming for which moringa could help due to its high levels of nutrients, with the main objective of feeding and nourishing children, mainly because children deserve a better lifestyle and I am dismayed by this situation since much is known about malnutrition in Ethiopia in general but almost nobody takes into account the Omo area for having rural areas and being inhabited mostly by tribes. And although we can use this solution perfectly in the Omo area, it is also very suitable for many other areas and communities in other parts of the world with malnutrition problems. Part of my proposal is thanks to the second objective proposed by the UN "Zero hunger" in which they give us valuable information and that should put us all on alert, since the numbers of famine and malnutrition are alarming, and mainly this was what sparked my interest in helping people who have not the same luck as me.

Personally, during the entire research process, I have had a strong thought which has prompted me to want to continue the project and encourage people to support it, not only in Ethiopia but worldwide. When I am doing something and I do not have enough time to eat I feel very bad, but, I cannot imagine the level of stress, fear and hunger that all these children suffer day by day and I am very worried knowing that innocent beings recently arrived on our planet have to suffer too much to achieve a not very good lifestyle. Feeding at an early age is essential for the growth and development of the human being in a long term, as well as being able to enjoy life every day by trying, discovering and savoring foods that are good for the organism. I care about the well-being of our peers and that is why my proposal is based on moringa crops and the end of malnutrition of children in the Omo zone.

Annex 1

I also request that the seeds be watered with this sustainable method once a week since it is necessary, and in case of rain it will not be necessary to water them. To carry out the annual watering control I recommend the use of this table (Figure 5.):

Month 1	Watering	Month 2	Watering	Month 3	Watering	Month 4	Watering
Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>
Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>
Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>
week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>
Month 5	Watering	Month 6	Watering	Month 7	Watering	Month 8	Watering
Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>
Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>
Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>
week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>
Month 9	Watering	Month 10	Watering	Month 11	Watering	Month 12	Watering
Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>	Week 1	<input type="checkbox"/>
Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>	Week 2	<input type="checkbox"/>
Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>	Week 3	<input type="checkbox"/>
week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>	week 4	<input type="checkbox"/>
Rainy weeks							
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16
Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24
Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32
Week 33	Week 34	Week 35	Week 36	Week 37	Week 38	Week 39	Week 40
Week 41	Week 42	Week 43	Week 44	Week 45	Week 46	Week 47	Week 48
Week 49	Week 50	Week 51	Week 52				

Figure 5. Table to take the weekly, monthly and annual count of watering.

The importance of keeping the weekly irrigation count for Moringa seeds is essential for the conservation and care of the plant, because if it is watered two or more times in the same week, the seed will rot or die. In order to use this table correctly the volunteers should have a single impression in which the representant of the volunteers may have control, each time the hectare of moringa seeds is irrigated, the representant should mark the sign of preference inside the box of the week, but if it rains, only in the “Rainy weeks” part will be pointed out.

References (APA):

- Agrotendencia. (2008). Cultivo de moringa. 21/03/2022, from Agrotendencia Website: <https://agrotendencia.tv/agropedia/cultivo-de-moringa-cuidados-y-manejo-agronomico/>
- Argaw Yirga Ashenafi , G Mwambi Henry , Getnet Ayele Dawit , and Fanta Melesse Sileshi . (2019). Factors affecting child malnutrition in Ethiopia. 19/03/2022, from African Health Science Website: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6794502/>
- BBC mundo. (2015). ¿Es seguro reutilizar las botellas de agua?. 18/02/2022, from BBC Website: https://www.bbc.com/mundo/noticias/2015/10/150930_salud_es_seguro_reutilizar
- BlueTriton. (2022). How long can unopened bottles of water be stored?. 18/02/2022, from BlueTriton Website: <https://www.nestle-watersna.com/who-we-are/frequently-asked-questions/>
- Cadman Bethany. (2020). What makes moringa good for you?. 11/02/2022, from MedicalNewsToday Website: <https://www.medicalnewstoday.com/articles/319916>
- Cisternino Alessia . (2018). ‘Green power’: Todo sobre la moringa, el "árbol de la vida". 19/03/2022, from Summum Website: <https://www.abc.es/summum/gastronomia-gourmet/abci-green-power-todo-sobre-moringa>
- Daniel Amah Nebyu . (2020). What factors are associated with the increase of anemia in Ethiopian children aged 6 to 59 months between 2011 and 2016?. 21/03/2022, from BMC Nutrition Website: <https://bmcnutr.biomedcentral.com/articles/10.1186/s40795-020-00371-6#Tab1>
- Eshete Soboksa Negasa, Robele Gari Sirak, Beyene Hailu Abebe, Mengistie Alemu Bezatu. (2021). Childhood Malnutrition and the Association with Diarrhea, Water supply, Sanitation, and Hygiene Practices in Kersa and Omo Nada Districts of Jimma Zone, Ethiopia. 13/02/2022, from Environmental Health Insights Website: <https://journals.sagepub.com/doi/full/10.1177/1178630221999635>
- EUE anthropologist Dr. Yusuf Farah Ahmed with contributions from H/Yesus Admassu. (1996). PRELIMINARY EXAMINATION OF MAJOR FACTORS AFFECTING SUBSISTENCE ECONOMY OF SOUTH OMO ZONE AND KONSO SPECIAL WOREDA IN SOUTH-WESTERN ETHIOPIA. 19/03/2022, from UNITED NATIONS DEVELOPMENT PROGRAMME Emergencies Unit for Ethiopia Website: https://www.africa.upenn.edu/eue_web/s_omo96may.htm
- Exoticca. (2013). Qué comer en Etiopía. 11/07/2022, from exoticca Website: <https://www.exoticca.com/es/afrika/afrika-oriental/etiopia/gastronomia>
- FAO. (1997). Una nueva publicación de la FAO se propone llevar el riego a pequeña escala a los campesinos del África subsahariana. 21/03/2022, from FAO Website: <https://www.fao.org/NOTICIAS/1997/970704-s.htm>
- Forest Water. (2020). Forest Water. 19/02/2022, from Forest water Website: <https://theforestwater.com/>
- Iniseg. (2020). Breve historia de Etiopía y la actual guerra civil. 19/03/2022, from Iniseg Website: <https://www.iniseg.es/blog/seguridad/breve-historia-de-etipia-y-la-actual-guerra-civil/>
- Mawira Chitima. (2022). Etiopía. 11/07/2022, from FIDA Website: <https://www.ifad.org/es/web/operations/w/pais/etiopia>
- MINISTRY OF LABOUR AND SOCIAL AFFAIRS. (2012). NATIONAL SOCIAL PROTECTION POLICY OF ETHIOPIA. 19/02/2022, from Microsoft Word Website: <https://www.socialserviceworkforce.org/system/files/resource/files/Ethiopia>

- Moringa Is a Trendy Superfood. Here's How to Actually Cook With It. (2018). Moringa Is a Trendy Superfood. Here's How to Actually Cook With It. 12/02/2022, from CookingLight Website: <https://www.cookinglight.com/cooking-101/essential-ingredients/superfood-moringa>
- My Lifetime Journey. (2022). Sur Etiopía. Tribus ancestrales en el Valle Rio OMO. 13/07/2022, from My Lifetime Journey Website: <https://mylifetimejourney.com/tribus-de-etiofia-y-valle-del-omo/>
- Oxfam Internacional.. (2021). Etiopía. 19/03/2022, from OXFAM Website: <https://www.oxfam.org/es/que-hacemos/donde-trabajamos/paises/etiopia>
- Ozturk Yagmur . (2020). Niños de Etiopía. 12/02/2022, from Humanium Website: <https://www.humanium.org/es/etiopia/>
- Padilla C. , Fraga Nidia and Suárez M. . (2012). Efecto del tiempo de remojo de las semillas de moringa (Moringa oleífera) en el comportamiento de la germinación y en indicadores del crecimiento de la planta. 25/03/2022, from Revista Cubana de Ciencia Agrícola Website: <https://www.redalyc.org/pdf/1930/193027579013.pdf>
- PANIAGUA, Antonio†* & CHORA, José. (2016). Elaboración de Aceite de semillas de Moringa Oleífera para diferentes usos. 19/03/2022, from Revista de Ciencias de la Salud Website: https://www.ecorfan.org/bolivia/researchjournals/Ciencias_de_la_Salud/
- Rose Wilson Debra. (2020). Moringa: Beneficios, riesgos y efectos secundarios. 21/03/2022, from MedicalNewsToday Website: <https://www.medicalnewstoday.com/articles/es/moringa>
- Saunders John and Smith Trevor. (2010). Malnutrition: causes and consequences. 12/02/2022, from PMC Website: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4951875/>
- Save The Children. (2013). SITUACIÓN EN ETIOPÍA. 21/03/2022, from Save The Children Website: <https://www.savethechildren.es/actualidad/situacion-en-etiofia#>:
- Sears Cori . (2021). How to Grow and Care for Moringa Plants. 12/02/2022, from the spruce Website: <https://www.thespruce.com/how-to-grow-and-care-for-moringa-plants-5076022>
- Seleshi Bekele Awulachew et al.. (2007). Water Resources and Irrigation Development in Ethiopia. 11/07/2022, from WayBackMachine Website: <https://web.archive.org/web/20110718023957/http://www.iwmi.cgiar.org/publications/>
- Silva Patricia . (2005). Environmental Factors and Children's Malnutrition in Ethiopia. 12/02/2022, from SSRN Website: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=648038
- Valenteshop. (2020). El uso de botellas de plástico para riego en el jardín. Cómo hacer un riego de goteo en un invernadero de botellas de plástico con sus propias manos: instrucciones paso a paso sobre cómo organizar el riego de goteo de las botellas de plástico. 21/03/2022, from Valenteshop.ru. Website: <https://valenteshop.ru/es/primenenie-plastikovyh-butyllok-dlya-poliva-v-ogorode-kak/>
- World Food Programme. (2020). UNICEF and WFP launch partnership to help fight malnutrition in Ethiopia. 19/02/2022, from World Food Program Website: <https://www.wfp.org/news/unicef-and-wfp-launch-partnership-help-fight-malnutrition-ethiopi>
- World Health Organization. (2020). Malnutrition. 12/02/2022, from World Health Organization Website: <https://www.who.int/news-room/questions-and-answers/item/malnutrition>
- Yaseen Khoshnaw Arshad. (1999). Moringa Oleífera: Natural nutrition for the tropics by fuglie (1999). 21/03/2022, from ResearchGate Website: <https://www.researchgate.net/figure/Moringa-oleifera-nutritional-value-of-leaves>
- Yelis Roa. (2019). 9 Ventajas + 3 Desventajas Del Riego Por Goteo En Las Siembras.. 25/03/2022, from Agronomaster Website: <https://agronomaster.com/riego-por-goteo/>

- Yguá. (2021). Evidencia científica sobre la actividad antimicrobiana de la Moringa. 21/03/2022, from Yagua Website: <https://yguamoringa.com/evidencia-cientifica-la-actividad-antimicrobiana-la-moringa/>
- Yguá Moringa. (2020). MORINGA OLEIFERA: PROPIEDADES Y USOS. 13/07/2022, from conasi Website: <https://www.conasi.eu/blog/consejos-de-salud/moringa-oleifera-propiedades-usos>