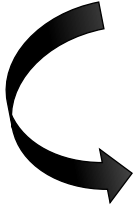


“PRISMALLA”

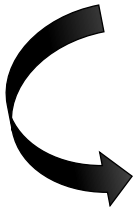
Mist water collector

Category: Environmental Engineering

2. Research Question or Engineering Problem



The lack of drinking water in human settlements triggers a series of problems that are linked and affect the development of humanity: health problems, lack of water security for companies, lack of jobs, insecurity, among others.



We observe this problem in the communities of the municipality of Las Vigas de Ramírez, Veracruz, where there is a great problem with the water supply, although there is a high presence of mist. Faced with this situation, we undertook the task of investigating a water harvesting method that is easy to implement, operate and maintain.

3.Methodology

The development of our project is thanks to the scientific method whose parts are observation, research, hypothesis development, experimentation, results and conclusions.

We focus on the community of Las Vigas de Ramírez, municipal head of the municipality with the same name, a town located at 2,420 meters above sea level, located in the mountains belonging to the Cofre de Perote mountain range, a national park, belonging to the cloud forest ecosystem, Due to its location, the displacement of very cold air masses from the north, which when meeting the air masses of the region (warm and very humid), cause the most intense / dense fogs but rain is scarce.

Given this situation, we analyze that the mist is water vapor, which could be condensed. There was the key to our project, how to make that water in the form of gas could be condensed or harvested in order to be delivered to the inhabitants in a liquid and safe form.

After investigating and analyzing the methods of condensation of water vapor through physical barriers, we found that the polyethylene shadow mesh was the best means to achieve this because it allows the passage of the wind, it is very light, easy to manipulate and above all that it exhibits the phenomenon of percolation that allows water droplets of various diameters to be accommodated therein.

We designed a device that would allow a mist catchment area to be presented by means of a prismatic structure of 2 X 3 meters per face fitted with mesh and condensed water receivers, which could be portable and easy to use and maintain, as well as mobile and very economical.

The mesh used in our project is 50% raschel mesh for shading crops and nurseries from the HORTOMALLAS family, OBAMALLA brand with Raschel fabric / flat thread of Polyethylene material stabilized against UV Rays and which provides a coverage of 50% of shade.

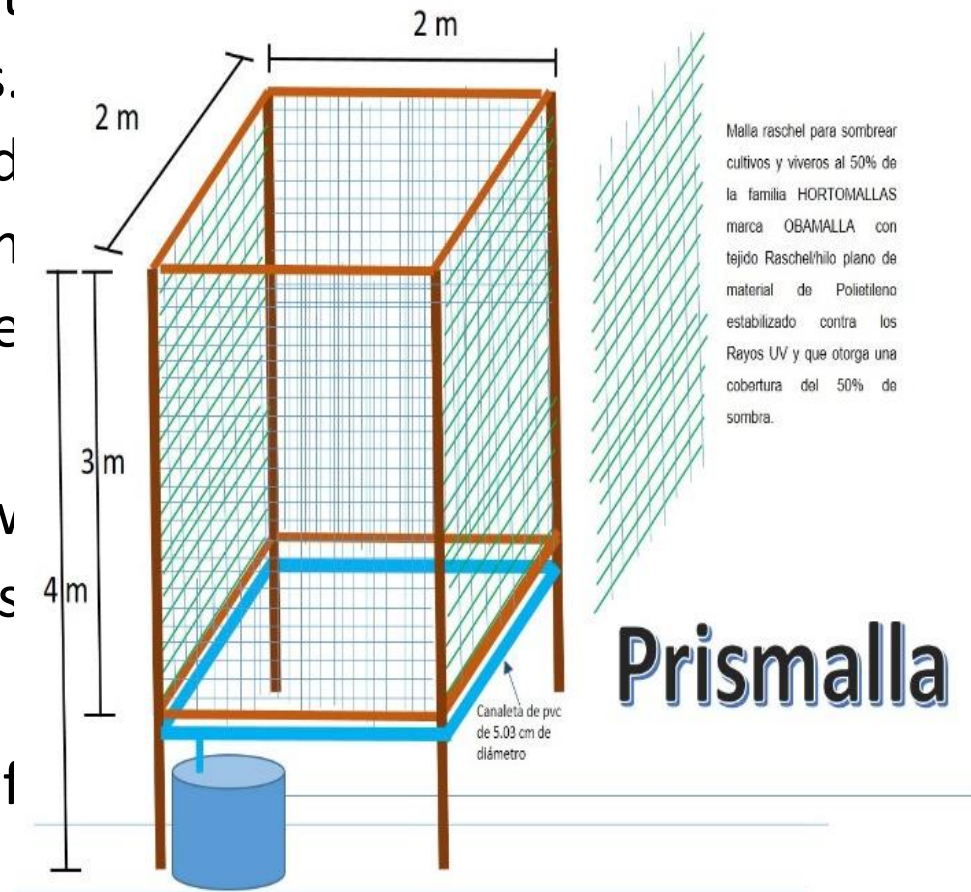
The Prismalla structure was built with recycled wood with an actual height of 4 m and a width of 2 m.

Through its structure, the mesh would help us to harvest the water by retaining tiny drops of water, which are not large enough to precipitate (1-40 microns- μm) but accumulate in the network until they form more drops. Large ones that, due to their weight, fall by gravity and are collected by a pvc gutter with a diameter of 5.03 cm along the entire base of the mesh of each face of the prism towards a storage area.

To achieve our project, factors such as air humidity, dew point, wind speed and direction, height, temperatures and available spaces had to be considered.

The test work was carried out during the months of February and March 2020, before the pandemic began.

In these months the presence of fog is high, starting from 4:00 p.m. on average until 7:00 a.m. the next day.



The performance of our collection method depends on the environmental variables and the design, in my research I found different products used for this problem, however many were impractical and needed to be fixed in the same place and in the same direction, which decreased their performance capacity, that is why I had the idea of making a prism covered with this mesh, which will help us to condense the mist from any direction that comes, we can also put it almost anywhere and it has a quick disassembly system that helps to people to transport it from one place to another very easily allowing with this to have a low cost, easy handling and maintenance but above all high performance system.



4.Results

The results we obtained were that when occupying six square meters of mesh, an average of 5 liters per day were obtained, which corresponds to one face, since it is a prism we multiply this value by 4 and we obtain a use of up to 20 liters per day.

Square meters of net	Amount of water obtained (ml)
2 square meters	100 ml
4 square meters	200 ml
6 square meters	300ml
8 square meters	400 ml

5. Interpretation of these results

Our functional prototype that we used was highly effective, since if we consider that it has an approximate construction cost with new materials of \$ 75 dollars, it solves the water problem of a family in an effective way, since it can produce the equivalent of a jug of water daily. A jug of water has an approximate cost in the market of \$ 1.50 dollars, resulting in an equivalent of 500 jugs, if we consider that in this area they do not sell jugs and that they would have to go to the city it would have a higher cost for transportation or a large physical effort if you have to walk.

Due to the lifestyle of the community where the project was tested, we know that a family of 6 people, which is the average in this area, consumes up to 3 jugs a week only in the kitchen, since in the absence of water they occupy it for almost everything except for bathing.

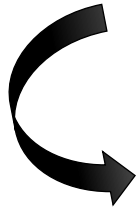
This represents a direct cost of \$ 4.50 dollars per week. In week 16 the cost of Prismalla would be paid.

It is necessary to carry out a study of the quality of the water obtained, since if it is useful for irrigation and animals, we must observe certain purification actions to the water obtained so that it is optimal for human consumption.

6. Conclusions



We effectively achieve the harvesting of mist water in a region where liquid is scarce, through low-cost, high-efficiency equipment that is especially easy to operate and maintain.



It is necessary to start with the work of creating a natural filter that accompanies the system to ensure the potability of the water for consumption.

7.References

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