



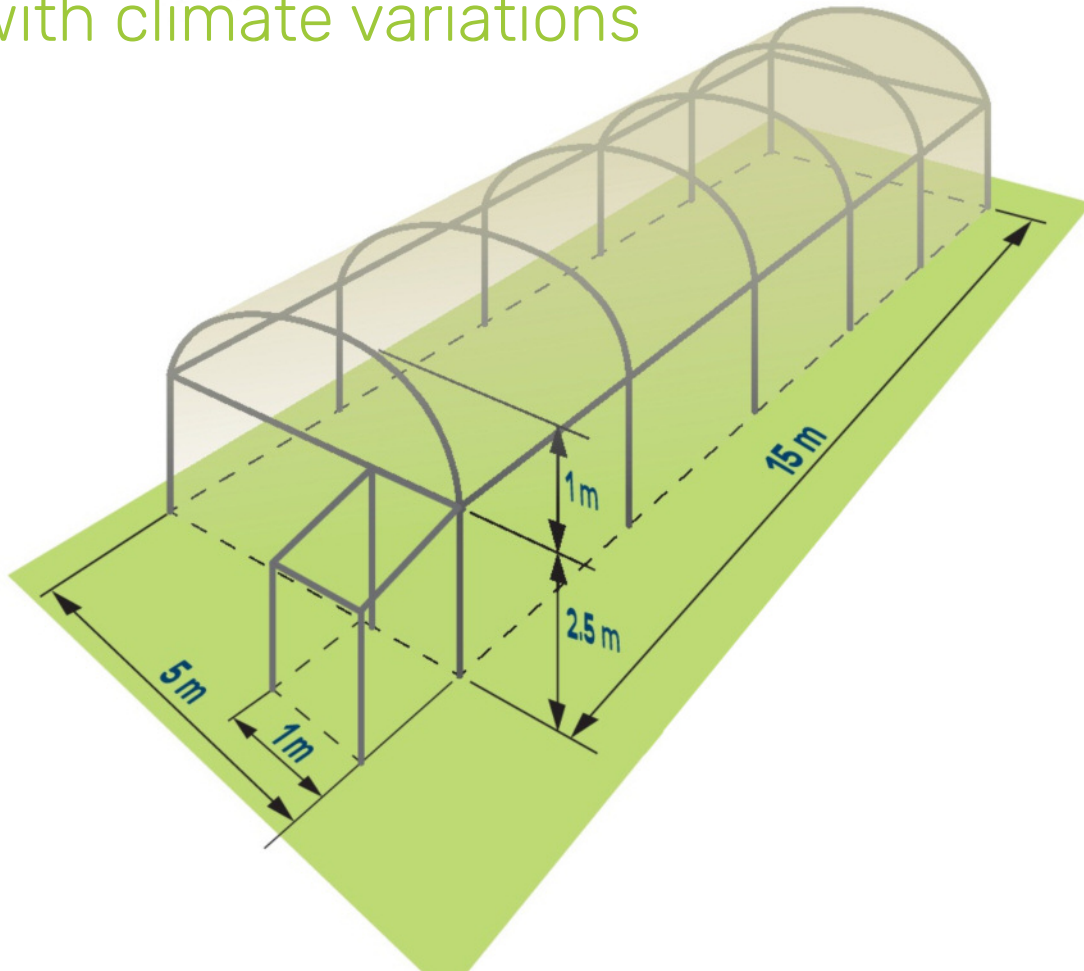
COMMUNITY GREENHOUSES

Helping us cope with climate variations



Community greenhouses

Helping us cope with climate variations



Francisco Escobar Avalos is part of the group that runs the community greenhouse of the El Pepeto canton (Municipality of Tenancingo, Department of Cuscatlán, El Salvador). The community group sees in this greenhouse an innovative approach to organic farming. This is Francisco's take on it:

"We didn't know anything about this technology here; I'd never even read about it. But we had so many problems with so many insects becoming immune to chemicals that we didn't know what to do.

The irony is that, right here, in this very territory, they created the first experiments with those famous hybrid seeds, the chemical fertiliser packets, herbicides, insecticide poisons, etc. People got all excited thinking something really good was going to happen. And that's what it looked like... but the truth always comes out. That stuff brought diseases, and polluted the air, water, and soil. Along with that came kidney failure, cancer, diabetes, and all those diseases that are common today and that are wiping out the population on a global scale.



In this greenhouse you can control a lot of harmful factors. When you combine that with other practices and techniques, there's a really big advantage.

Here we cultivate pest-free, there's no need for poisons, and we produce a bigger quantity of healthy food in a really small space that we make the most of..."

Purpose of greenhouse technology

When you cultivate in a greenhouse you can produce vegetables, fruit trees, herbs and ornamental plants all year, protected from increasingly unreliable weather conditions as a result of climate change. Sometimes the temperature goes up or down, other times rains don't come or it rains too much. When you reduce these risks, crop success is much more likely.

In general the frames are made of wood, bamboo, metal or a combination. They have antivirus micromesh and/or transparent plastic roofs and walls that protect from ultraviolet rays. The crops are planted in the ground. These small-area investments meet the need of producing food on a family level that improves quality of life and nutrition for farmer families and generates crop surplus that can be sold.

Temperature and humidity in the interior of the greenhouse are important for creating a favourable environment for crops. The location, orientation in relation to the sun or wind, terrain slope, model type, construction materials, irrigation, and crop management are all key factors to avoid pest infestation and diseases within the greenhouse.

Step by step: Setting up a community greenhouse

The proposed model is a greenhouse with a domed ceiling that covers an area of 75 square metres (m²). The frame is made of galvanised metal pipes and is covered by antiviral micromesh.

1. Create the administrative group

The Salvadorian Centre for Appropriate Technology, known as CESTA (Friends of the Earth El Salvador), is an association in charge of promoting technology suitable to the social and ecological conditions of El Salvador. It coordinates project implementation with municipal authorities. This is how, in 2014, they began to look for and choose groups of people within the project area who were interested in applying innovative technologies.

This first step is crucial for success because it goes hand in hand with a training process. The eight people from each group need to clearly understand the responsibilities and benefits that they'll obtain when starting a community greenhouse.

The group will receive training on:

- ✓ Preparing organic fertilisers
- ✓ Ecological pest and disease management
- ✓ Greenhouse crop management

2. Choose and prepare the location for the greenhouse

Some of the most important criteria are:

- ✓ Build on flat ground to protect the greenhouse from water flow. If the terrain has a slope, you need to level it.
- ✓ Locate close to a chlorine-free water source for irrigation. If this is not possible, let the water sit before watering so that the chlorine will volatilise. Chlorine affects plant roots.
- ✓ If there are animals around, fence in the area to avoid damage to the greenhouse structure.



3. Delineate the area

After this step, you will need someone who specialises in greenhouse setup and construction. The dimensions for this community greenhouse are 15 metres long by 5 metres wide and 2.5 metres high. In the centre the arched lintel is 3.5 metres high. Following these measurements, use tape, string, hammer and stakes to mark the holes and delineate the area.

4. Prepare the twelve support bases and anchors

Cut in half the 6-metre long, 1-inch diameter pipes, which will be the frame base. Then weld onto each 3-metre pipe two ½-inch rod pieces in a cross shape on the part that will be buried, to serve as anchors.

5. Make the holes for the bases

Position the greenhouse support bases 3 metres apart with the help of a plumb line or spirit level, and fill with concrete or a mixture of concrete and gravel. It's necessary to position the corner bases first so as to then set up a string that will guide the location for the middle bases on either side. The hole for each base is 40 centimetres wide by 40 centimetres long by 50 centimetres deep. Each post should reach a height of 2.5 metres above ground.

6. Mount the arches for the roof

In this step it's necessary to arch the six ¾-inch pipes. If the group doesn't have a machine to do this, you'll need to improvise and curve the pipes by bending them against a tree. As the posts measure 1-inch and the arch pipes are ¾-inch, they should fit smoothly in the posts or bases. Make a

hole with a drill to bolt the arched pipes onto the posts.

7. Bolt the frame

To stabilise the bases, weld five ¾-inch pipes around the frame where the bases fit into the arches.

8. Lay the tensors

Lay tensors on each post using No. 12 wire to give the structure greater stability against wind and rain.

9. Cover the frame with antiviral micromesh

The micromesh is 3 metres wide. Before putting it on, you have to join two 15-metre sections and sew them to cover the part of the roof. Then drape and sew up the side covers.

The covering is attached to the metal structure with self-tapping screws using 10-centimetre rubber strips to keep the screws from tearing the micromesh in the wind.



10. Build the entrance and porch

The door is 1.20 metres wide to allow entrance with materials and tools. At the entrance to the greenhouse, build a porch and a small square receptacle 40 centimetres wide and long and 10 centimetres deep. That’s where you’ll put disinfectant liquid to avoid virus and bacteria from getting into the greenhouse on the shoes or boots of workers or visitors. It’s important to make two doors: one at the entrance to the porch and another inside the greenhouse.

Materials and equipment required to build a greenhouse

- ✓ Tape measure
- ✓ String
- ✓ Stakes
- ✓ Hammer or mallet
- ✓ Machete
- ✓ Plumb line
- ✓ Saw
- ✓ Drill
- ✓ Extension cord
- ✓ Shovel
- ✓ Pick
- ✓ Hoe
- ✓ Organic fertiliser
- ✓ Drip irrigation system

Costs and difficulties in construction

Materials and costs of building a greenhouse

Materials	Unit cost	Total cost
6 x 1-inch pipes	\$16.75 USD	\$100.50 USD
14 x ¾-inch pipes	\$11.75 USD	\$164.50 USD
100 self-tapping screws	\$0.10 Ctv. USD	\$10.00 USD
5 pounds of No. 12 galvanised wire	\$1.25 USD lb.	\$6.25 USD
50 metres of rubber or old hoses to use as rivets	\$0.28 USD per metre	\$14.00 USD
85 metres of antiviral micromesh	\$4.75 USD per metre	\$403.75 USD
2 bags of cement	\$8.50 USD	\$17.00 USD
Gravel	\$5.00 USD	\$5.00 USD
Sand	\$3.00 USD	\$3.00 USD
Labour for 8 days	\$7.00 USD	\$56.00 USD
Irrigation system, water tank, hose, nipples, valves, etc.	\$320.00 USD	\$320.00 USD
Total		\$1,100.00 USD

Note: Prices can vary from one region to another. Without an irrigation system the cost is \$780 USD.

Among the **difficulties** encountered are:

- ✓ Not having an accessible terrain with access to water.
- ✓ Not having builder's tools.
- ✓ Not being able to hire a builder with basic knowledge of greenhouse construction.
- ✓ The greenhouse can be built with local materials such as wood or bamboo, but they don't last long when exposed to the elements.
- ✓ Financing is required due to the high cost of materials.
- ✓ As this technology is combined with the installation of a drip irrigation system, it's more expensive.

- ✓ When preparing the planting beds and removing the soil, add organic fertiliser and disinfectants such as ashes and agricultural lime.
- ✓ Furrows are designed according to crop.
- ✓ If a drip irrigation system is unavailable, use a watering can or hose. The advantage of the drip irrigation system, besides saving water, is that it allows you to supply the organic foliar fertiliser all at once.
- ✓ Have a product application plan, be it for foliar and solid fertiliser, or preventive pest and disease control.

Recommendations

- ✓ In this case, CESTA has decided to use 1-inch and ¾-inch diameter iron pipes because of their durability.
- ✓ Which way the greenhouse faces is very important. Plant beds are often built north to south, following the course of the sun, but this is not always the best direction in relation to local predominant winds. It's best for the greenhouse to face into the wind.



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