



DRIP IRRIGATION

It changed my life



Drip irrigation

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Blanca Idalia Rivera Sorto, of the Colonia 14 de Julio in the cantón San Pedro, (Jiquilisco jurisdiction, Department of Usulután, El Salvador), always wanted to grow a home garden, but despite the setbacks, she found a way that is changing her way of looking at life and cohabiting with nature:

“I started getting involved in all this organic stuff little by little through workshops on garden practices with the Coordinating Association of United Communities of Usulután, known as COMUS. We’ve been learning how to make different organic inputs like bokashi, bio-fertilisers, repellents.

Then came the drip irrigation system. I saw it as my salvation, because before it was impossible for me to work with vegetables because of the lack of water, and because I didn’t really know much about what to do. But with the drip irrigation system, things changed. In order to qualify for this little system, they took some requirements into account: I’m a community promoter, I’ve got my own plot, I’ve got a well at home, and I was already working with an interest in vegetables.

This isn’t subsidised, nor is it credit either. I see it as an incentive to hard work and willingness to want to get ahead and secure food close to home.”

Purpose of installing a drip irrigation system

This technology has the capacity to make almost any kind of cultivable land and soil type produce vegetables and fruit trees, diversify the farm and diet, lower water consumption, and contribute to the family's food security in a small space.



It's an easy-to-manage system with quick installation. It increases resilience to climate change as it helps mitigate irregular rainfall and is used to plant during the dry season.

A typical simple drip irrigation design is composed of three parts:

One: The water source, such as wells or a spring.

Two: The control unit, comprised of the water tank, filters and pump.

Three: The distribution network, with two sections: main lines, and distribution lines, such as drip lines, hoses and pipes, called polytubes.



Step by step: Installing a drip irrigation system

1. Measure the area where the garden will be planted.
2. Fence it with posts and cloth or chicken-wire, to protect it from animals.
3. Determine the place where the water tank will be installed, and build a half-metre-high platform for it.
4. Place a PVC pipe at the base of the tank with its shut-off valve and filter, following the technical recommendations of an expert.
5. In doña Blanca Idalia's case, the 120-square-metre distribution network is divided into three parts to streamline the water distribution and irrigate twice a day. First, the lower part is tended to, and after 20 minutes, valve 1 shuts off and the central section is attended to, opening valve 2. It irrigates for another 20 minutes, then valve 2 is closed, and valve 3 opened to finish with the highest part.
6. The lateral distribution layout is pegged down with stakes and wires, both pipes and polytubes, over the beds or benches. The self-tapping screws which will serve as drippers or emitters must be spaced according to the spacing of the plants. When installing, make sure they drip.

Tools and materials required

- ✓ Hoe
- ✓ Pickaxe
- ✓ Shovel
- ✓ Machete
- ✓ Hammers
- ✓ Nails and clamps
- ✓ 1 x 50-metre roll of chicken-wire
- ✓ Digging bar or tree planting bar
- ✓ Tape measure
- ✓ String
- ✓ 1 HP Water pump



Costs and difficulties

Labour costs of the experiment

Description	Quantity	Unit price	total
Roll of wire mesh, 1.5m x 50 m	1	\$35.00 USD	\$35.00 USD
½-inch PVC elbow	3	\$0.25 USD	\$0.75 USD
½-inch Tee PVC fitting	10	\$0.40 USD	\$4.00 USD
Binding wire	1 libra	\$0.70 USD	\$0.70 USD
½-inch PVC pipe	2	\$1.75 USD	\$3.50 USD
Metal saw	1	\$1.00 USD	\$1.00 USD
Polytube roll	1	\$15.00 USD	\$15.00 USD
1-inch self-tapping screws	150	\$0.08 USD	\$12.00 USD
Screwdriver	1	\$2.00 USD	\$2.00 USD
Tank with 5-barrel capacity (2,500 litres)	1	\$81.00 USD	\$81.00 USD
Glue	1	\$3.00 USD	\$3.00 USD
½-inch slip cap	3	\$0.25 USD	\$0.75 USD
2½-inch pressure regulator	3	\$0.90 USD	\$0.90 USD
2-inch female adaptor	1	\$0.30 USD	\$0.30 USD
Pliers	1	\$3.50 USD	\$3.50 USD
Total excluding transport		Total	\$163.4 USD

Note: A submersible 1 HP pump costs \$600 USD. Building a round wood base for the tank and a rustic shed from local materials costs about \$150 USD, including labour.

Some of the encountered **difficulties** or limitations are:

- ✓ Not having a good enough water source.
- ✓ Needs a minimum of \$163 USD investment.
- ✓ Not having an electric submersible pump.
- ✓ Not owning land.
- ✓ No access to an expert in drip irrigation installation.
- ✓ Poor knowledge of the cycles and demands of crop irrigation.
- ✓ Not knowing the type of soil in the garden.
- ✓ Not checking the drippers. If they're blocked, less water comes out.
- ✓ Not having the funds to fence in the place.

- ✓ Not having vegetable seeds.
- ✓ Not knowing about companion planting and beneficial crop rotations.
- ✓ Not making a garden management plan.

Recommendations

- ✓ Firstly it's necessary to understand water behaviour within the soil. The drop of water that falls on each point is distributed equally. When a trial pit is dug into the ground, you can see the water seeping through in the shape of an onion bulb or earthenware jug. However, depending on the type of soil, it permeates more or less easily. For example, in sandy soils, the water infiltrates deeper and more easily than in fine or clayish soils where it spreads out more to the sides and goes less deep. That's why it's important to regulate watering times, to cover smaller or larger areas as required.
- ✓ It's important to know how much water is available to tend to a certain area because a screw dripper emits between 2-10 litres of water per hour. With this information and knowing the water needs per plant per day, according to the kind of vegetable or fruit tree, calculate how much water is needed per day to water the garden.
- ✓ A recovery rate in a well that's less than 10 gallons per minute is considered weak or limited.
- ✓ A 10-25 gallons per minute rate is regular.
- ✓ A rate of more than 25 gallons per minute is ideal.
- ✓ Find out if the flow of the well is enough or not during the driest part of the year.
- ✓ Make a chart with the crop's water needs in litres per square metre (lt/m²) and in litres per day (lt/day) according to the plant's stage from nursery to harvest, and learn how to use it really well.

Crop	Early stage (lt/m ²)	Development stage (lt/m ²)	Middle stage (lt/m ²)	Final Stage (lt/m ²)
White onion	4	5.6	5	8
Cabbage	3.6	6	8.4	7.2
Cucumber	3.6	5.6	7.2	6
Marrow	3.6	5.6	7.2	6
Bell pepper	2.8	5.6	8.4	7.2
Radish	3.6	4.8	7.2	7.2
Tomato	3.6	6	9.2	4.8
Carrot	3.6	6	8.4	7.2

Early stage: From planting until 10% of the seeds have sprouted. In transplant crops such as tomatoes, the early stage is considered the nursery stage.

Development stage: Begins when 10% of the seeds have sprouted and continues until all have sprouted. In transplant cases, this stage starts when the nursery plants are planted in the garden.

Middle stage: From the time the crop covers the whole bed or bench until the grain or fruit ripens.

Final stage: From fruit to harvest.

What do the numbers on the chart mean?

Each figure located on the horizontal line of each crop represents the water needs according to its life stage. Each number is expressed in litres of water per square metre per day. To better understand this information, here is an example using the tomato crop for a 100-square-metre garden, measuring 10x10 metres.

To find out the 100-square-metre tomato garden’s water needs, we find “tomato” on this chart:

Tomato	3.6	6	9.2	4.8
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To know the watering needs during the early stage, multiply 3.6 times 100. That’s 360 litres of water per day. 6 times 100 is 600 litres of water per day during the development stage. 9.2 times 100 equals 920 litres during the middle stage, and 4.8 times 100 means 480 litres are needed per day for the final stage.

Blanca Idalia tells us about her income from the sale of surplus tomatoes in 2016:

“The tomatoes and cucumbers did really well. I got around 28 boxes of tomatoes in a 3-month period, and I sold each box for \$10 USD. And with the cucumbers, I got around 2,400, which I sold a hundred at a time and by the sack full (quintal sacks, 46kg); they’d pay between \$12 USD and \$15 USD for that. I made about \$240 USD from the sale of cucumbers. So from cucumbers and tomatoes altogether I ended up making almost \$500 USD.”

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