The testing of
Tomato Seeds

A collaboration between
Live&Learn
and Maldives Matter

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Table of content:

1. Description test

The reason for the testing of the send tomato seeds is to see whether tomatoplants can grow in a controlled environment on the Maldives. If the test is successful, this will be an indication that tomatoplants, and other crops, will have potential to successfully be cultivated and grown in (cooled) greenhouses in the Maldives.

The test will be a success when tomatoplants can be grown to a length of 2 to 2,5m. The don't need to bear fruits.

An optimal, promising, result will be:
If during this test the plants can be grown to 2/2,5m in length (or longer) with 8/9 bunches (clusters) of 5 tomatoes each, the bottom bunch(es) of tomatoes being red.

To test will consist of twelve plants. Four plants from each tomato species each.

2. Inventory

Product	description	Amount	Arranged by
Tomato seeds	Montebello	1 bag	MM
Tomato seeds	Aruru	1 bag	MM
Tomato seeds	Cheramin	1 bag	MM
Greenhouse facility	-	1	LL
Wire	To guide the plant	10	LL
Plugs	Growing medium	100	LL
Glass wool/rockwool	Growing medium	30	LL
Slabs	Growing medium	3	LL
Gutter	-	40 x 360 cm	LL
Dripsystem	-	1	LL
Waterpump	-	1	LL
Tubing	For waterpump	5 m	LL
Nutrients	Plantnutrients	1	MM
Nutrients	vegetablenutrients	1	MM
EC measurement device		1	LL
pH value sticks		100	LL
Camera	To report progress	1	LL
Computer + internet	To report progress	1	LL
Log template	To report progress	1	MM

Maldives Matter = MM
Live&Learn = LL

Here follows a description and further specifications of the inventory needed:

Tomato seeds
The seeds sent in sample bags.
F1 type tomato seeds, produced by Rijkzwaan.
Three types which are most resilient to the Maldivian climate are selected.

Greenhouse facility
A greenhouse facility in the Maldives is needed to house the plants.
It should be a closed or semi-open greenhouse. No mechanical cooling is needed for this test. Ideally gutters, dripsystems and a waterpump are already present. A watersource and buffer suitable for watering the plants should be present.

Photos of similar greenhouses provided in appendix. These are examples of greenhouses that fit requirements.

Wire
To bind the plants to when the reach a size of approximately 1,5 m. This will likely already be present in the greenhouse facility.

Plugs
Small plugs in which the seeds are planted. Each plug can grow one plant. The seed is put about 5 mm deep into the plug. The plant can grow up to 10cm in this growing medium.
This medium is used in phase 1 of the grow process.

Glass wool/Rockwool

Plugs with plants are put in rock wool blocks. These blocks can consist of rockwool or glass wool. Plants can grow up to 30/40 cm in these blocks. The plants are watered via a dripsystem.

Slabs
Slabs are placed on a gutter. Incisions are made in these slabs, however not directly under the rootsystem of the plants.
Height: 10 cm
Width: 40 cm
Length: 80-120 cm

Gutter
Should be able to house the slabs.

Waterpump
Needed to water the plants.
Should have a timer, capable of regulating timeintervals. (For example: every 10 minutes, water the plants for one straight minute.)

Tubing
Compatible with waterpump.
5m length minimum.

Nutrients

The needed nutrients to add to the water are a combination of two types: Plant-nutrients and vegetable-nutrients. They are mixed. The mixture should measure a value of EC=5. The amount of nutrients/L is mentioned on the packaging.

EC measurement device
The Electrical Conductivity (EC) is one of two most important factors in nutrient and water management. This device is needed to measure the EC when mixing the nutrients.
This might already be present at the facility.

Photo provided in appendix.

pH value sticks
The pH value is one of two most important factors in nutrient and water management. A bundle of a sticks should be present to check pH value of (nutrient)water. This will likely already be present at the facility.

Camera
To log the process, photos will have to be made. This can be done with a camera, or smartphone.

Computer + internet
The process of the test should be logged.
pH values, EC values, anomalies etc should be logged and written down. Of course updates of this logged should be made available if needed to Maldives Matter, Live&Learn and possibly other parties or experts.

Log template
A template for tracking the growth and conditions of the plants is provided in the appendix.
Each plant should have its own log-entries.
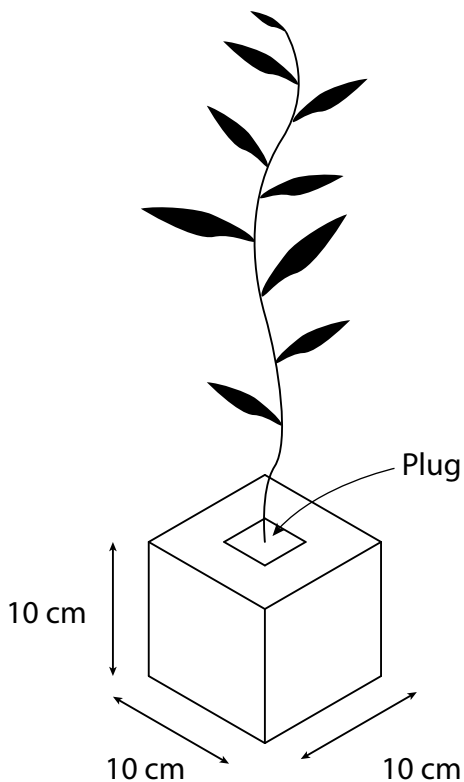
3. Growing Phases
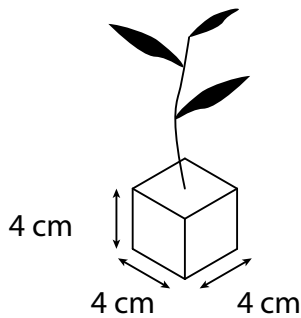
Phase 1

Seed is to be planted 0,5 cm deep into the plug. Water the plugs with seeds daily. After a few days, a plant will emerge. When the plant reaches a length of 10 cm, put the plug in the block (see phase 2).

4 cm

4 cm   4 cm
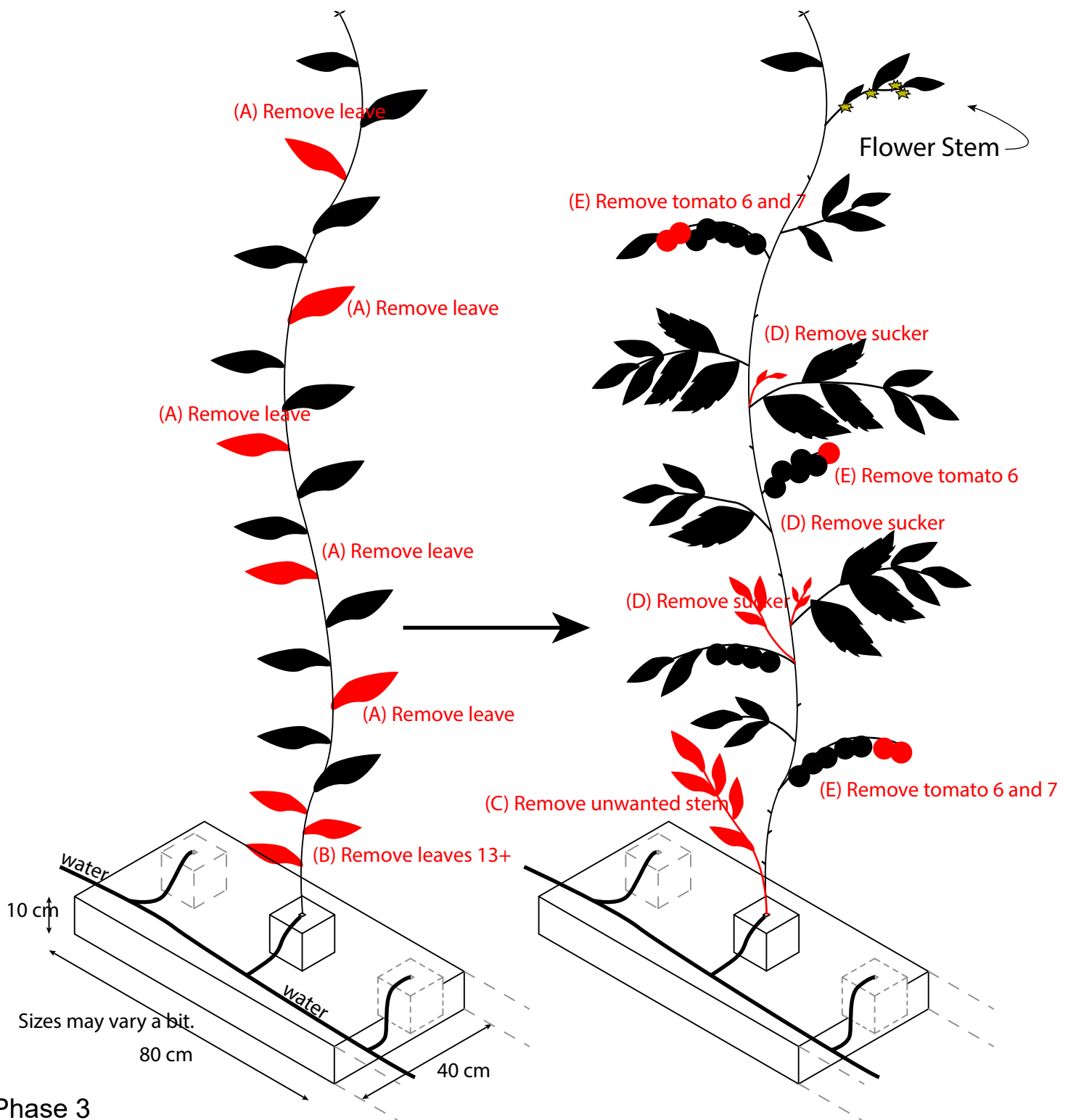
Sizes may vary a bit.

Phase 2

The plant will continue to grow. Daily watering continues. Watering can now be done with a dripsystem. When the plant reaches a size of 30-40 cm, put the blocks on the slabs.

3,5 plants (one per block) can be put on 1m2 of slab.

This means about 4m2 of slab is needed to place the twelve plants on.

Plug

10 cm

10 cm   10 cm

Sizes may vary a bit.

(A) Remove leave

(A) Remove leave

(A) Remove leave

(A) Remove leave

(A) Remove leave

(B) Remove leaves 13+

water

10 cm

Sizes may vary a bit.

80 cm

40 cm

water

Flower Stem

(E) Remove tomato 6 and 7

(D) Remove sucker

(E) Remove tomato 6

(D) Remove sucker

(D) Remove sucker

(E) Remove tomato 6 and 7

(C) Remove unwanted stem

Phase 3

When the plant reaches a lengt of 1 - 1,5m it should be twisted around a wire.

The process in this test is called ''single stem pruning'':
Every third leave, starting from the top should be removed. (A) The leaves will turn into branches later. The crown does not count. This is done until there is a maximum of 12 leaves on the plant. If there are more then 12 leaves, remove the lower leaves as well. (B) Keep in mind, that still rule (A), removing every third leave, still should be taken into account.
The plant should just one stem. Other stems are to be removed too. (C)
To prevent extra branches, small branchsplit should be removed as well. These branchsplits are called suckers. (D)
Do not remove the flower stems. These will produce tomatoes. When a bunch of tomatoes has formed. Keep the bunch to a maximum of **5** tomatoes, any higher number of tomatoes per bunch should be removed. (E)

Every 1,1 weeks a new bunch of tomatoes will grow on the plant.
After a period of 8 weeks, the lower tomatobunches will become red.
A plant of 2 - 2,5m in length with 8/9 bunches of 5 tomatoes each desirable. Of course the plant can be grown taller. If the plantstem grows weak and becomes smaller than a pinky finger, 2-3 more leaves (which can turn into branches) can be left on bottom of the plant.

4. Watering

The plants need to be watered daily.
When the plant starts to have a decent length, roughly 10-12L water is used per m2 slab.

The nutrients added to the water are a combination of plant-nutrients and vegetable nutrients. When mixed, they should measure an EC=5 value. The watering can be done with help of a waterpump and some tubing. The pump should have a timer. Set the timer on an interval where every other 10 minutes, roughly <u>one continuous minute</u> the plants are watered. Amounting to a total of 10-12L per day/m2 slab.

5. Reporting Process

It's important to log the growing process, and factors regarding growing conditions.
- Plant size
- Amount of added water/day
- pH value of water
- EC value of water
- Temperature
- Any anomalies

Update the log two times per week. Once on Sunday and on Wednesday.

A template for the log can be found in the appendix.

5. APPENDIX

A few examples of greenhouses that would be suitable for the test.

Kuredu Resort greenhouse

Modelfarm (Laamu Atoll)

Maldives Project by Living Shade

Maldives Project by Living Shade

EC measurement device

PLANT #								
Weeks	Date	Lengt cm	Temperature (C)		L water/day	pH value	EC value	other
			12:00	20:00				
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								