Anna-Liisa Aunio
Department de sociologie, Collège Dawson

Coordinatrice, Études environnementales
Coordinatrice, jardins sur les toits
Chercheur principale, Projet justice alimentaire et la durablité


Parsley 1.50
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Urban Growing Of Tomatoes

Anthony Licursi, John-Nicholas Cheng-Tarantino, Mitchell Teitelbaum, Ryan Dupuis

Abstract

This experiment was conducted in order to see if there was a difference in the overall growth, success and yield of plants with respect to the area that the plants were grown in and their access to sunlight. Tomato plants were used to represent all plants in the experiment. Since urban gardening is becoming more and more popular, the question of where to grow the plants in order for them to grow to their full potential in an urban environment often arises among urban gardeners. This experiment was conducted in the hopes to give them a concrete answer. It was hypothesized that the plants on the rooftop would produce more tomatoes with a greater overall mass of the tomatoes combined than the plants on the ground because the plants on the rooftop had more access to sunlight. The hypothesis was tested by placing three tomato plants in self-watering containers on the rooftop and three tomato plants in self-watering containers on the ground. This was conducted over the summer of 2015 from May to August. The final results did support the hypothesis. More tomatoes were produced from the plants on the rooftop (62) than from the plants of the ground (38) and the combined mass of the tomatoes from the plants on the rooftop (2.310 kg) was greater than the combined mass of the tomatoes from the plants on the ground (1.690 kg).

Introduction

With more and more urban development occurring in places all over the world, space for agriculture and gardening is becoming more and more compromised with urban communities expanding into the previously regarded "farm towns". It is essential that the growth of agricultural crops and natural foods continues for the sustainability of human life. Therefore, urban gardening is becoming more and more popular in order for people who live in urban communities to be able to produce their own fresh produce[1]. Urban gardening has become something that is practiced in many communities however there is limited scientific knowledge on the topic when it comes to the success of the growth of produce in urban environments[2]. Some studies have concluded that the rate at which trusses (flower clusters) appear on tomato plants is directly proportional to the temperature at which the plants are grown. This can lead to the conclusion that the plants with greater sun exposure may display increased growth speed, and overall increased growth, as compared to the plants with less sun exposure[3].

For this experiment, the plant that was tested was the Lycopersicon lypersicum tomato plant. The objective was to determine the best location for the growth of this type of tomato plant grown in self-watering containers. It was hypothesized that the plants that were placed on the roof would yield overall yield more tomatoes than the plants on the ground since there were no physical barriers that would cut off access to sunlight for the plant. The exact question being asked is, should urban gardeners grow their plants on rooftops or on the ground and will there be a difference?

Materials and Methods

The materials needed for the experiment are three 20 L buckets and three 30 L buckets as well as six 0.75 L buckets (yogurt containers), screw driver, 15-20 L of soil per 20 L bucket and Jaune Flamme seeds (enough to grow 6 plants). The way to prepare the containers is by making a hole in the center at the bottom of the 20 L bucket larger enough so that the 0.75 L container can fit through it and sit comfortably on the edges of the hole, leaving the 0.75 L container suspended. 60 small holes should be made into the 0.75 L container using a screw driver. These holes will be the location of water/nutrient uptake by the roots. Also, make sure to make another hole at the bottom of the 20 L bucket so that a hose can pass through for the watering process of the plants. Once the 20 L bucket is done being prepared, it is placed into the 30 L bucket and 15-20 L of soil are placed into the 20 L bucket. Now, the 0.75 L container is filled with soil and suspended in the space between the bottom of the 20 L bucket and the 30 L bucket known as the "reservoir". This is where the water will go. Three containers (combination of 20 L bucket and 30 L bucket with 0.75 L container) will be placed and the rooftop and 3 on the ground preferably between two 2 story buildings.

In order to complete the experiment, the plants must be planted early in the summer months towards the end of May. In order for successful germination. Once the seeds are planted, the bucket should be watered once a week (Fridays for this experiment). The water will be going into the reservoir section of the container from a hose that send water into a tube that bypasses the soil and goes into the reservoir between the bottom of the 20 L bucket and the bottom of the 30 L bucket. Observations and collection of tomatoes should start 2 months after the day the seeds were planted, and then they should happen once a week for 5 weeks after the first day of observation. The number of tomatoes yielded by each plant should be recorded and the combined mass of the tomatoes from a given plant on a given day should be weighed out. The independent variable for this experiment is the location of the tomato plants and the dependent variable is the maximum yield of the plants. The statistical significance of the data will be tested using the T-test.

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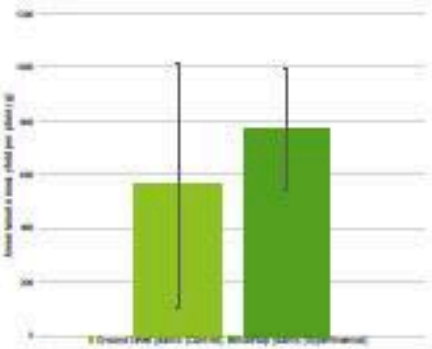
Graph 1.0: Mass Yield of Tomatoes in the Control and Experimental Groups



The results represented on the left in light green are the results for the control group of plants on the ground level. The results on the right in the dark green represent the experimental plants placed at rooftop level. The error bars represent the standard deviation for each of the two groups being tested.

Table 1.0: Mass Yield of tomatoes in the Control and Experimental Groups

	Ground level plants (control)	Rooftop plants (experimental)
Mean mass of tomato yield per plant (g)	563.3 g	770.0 g
Standard deviation (g)	± 455.4 g	± 222.7 g

Fig.1 Blossom end rot

Discussion

After analyzing all of the relevant data, it was determined that the mean mass of the tomatoes from the plants on the ground was 563.3 g. The mean mass of the tomatoes from the plants on the rooftop was 770.0 g. The standard deviation for the plants on the ground was ± 455.4 g. The standard deviation for the plants on the rooftop was ± 222.7 g. after have completed the T-test, it was determined that there was no statistical significance when it came to the data obtained which means that our hypothesis was not proven. This is likely due to the fact that there was a huge variation in the mass of tomatoes that came from each of the trees. It was concluded that the reason that the plants on the roof gave overall more tomatoes due to the fact that they had more access to sunlight because the plants on the ground were between two 2 story building which when the sun was in certain part of the sky at certain parts of the day, would have blocked the sun's rays from reaching the plants, and access to lots of sunlight is essential for optimal growth of Lycopersicon lycopersicum tomatoes[3]. As in E. Heuvelink's experiment, the results in this experiment also showed that the plants that were grown with more access to light and a higher temperature were more successful. As well, blossom end rot was observed on some of the tomatoes from the plants at ground level. Blossom end rot is when a dark spot arises on the fruit growing from the plant and is usually due to irregular watering patters and calcium deficiency[4]. When it comes to this experiment, the blossom end rot was likely due to the fact that the soil for the plants at the ground level took longer to dry out compared to the soil for the plants on the rooftop because the plants on the ground had less access to sun. In both locations, the plants experienced wilt, however the plants on the ground had even more wilt than the plants on the rooftop. Wilt is when a bacteria or fungi attacks a plants leaves and the leaves begin to experience discoloration and eventually fall off or it attacks the entire plant itself and it can end up dying and can be caused by loss of moisture in the soil[5]. In this situation, the fact that the plants on the ground experienced more wilt than the plants on the roof is likely due to the fact that the soil for the plants on the ground took longer to dry due to limited access to sunlight compared to the soil for the plants on the roof. This experiment can help urban gardeners decide where to plant their crops.

Fig.3 Abstracted version of self-watering container

Fig.4 Rooftop (angle 1)

Acknowledgements

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3) Christman S. "Lycopersicon lycopersicum" Floridata Plant Encyclopedia. Web (2010). Available from: http://www.floridata.com/Plants/Solanaceae/Lycopersicon%20lycopersicum/718.

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Cherry faced meadowhawk

Order: Odonata
Family: Libellulidae

Tarnished Plant Bug

Order: Hemiptera
Suborder: Heteroptera
Family: Miridae
Species: Lygus lineolaris

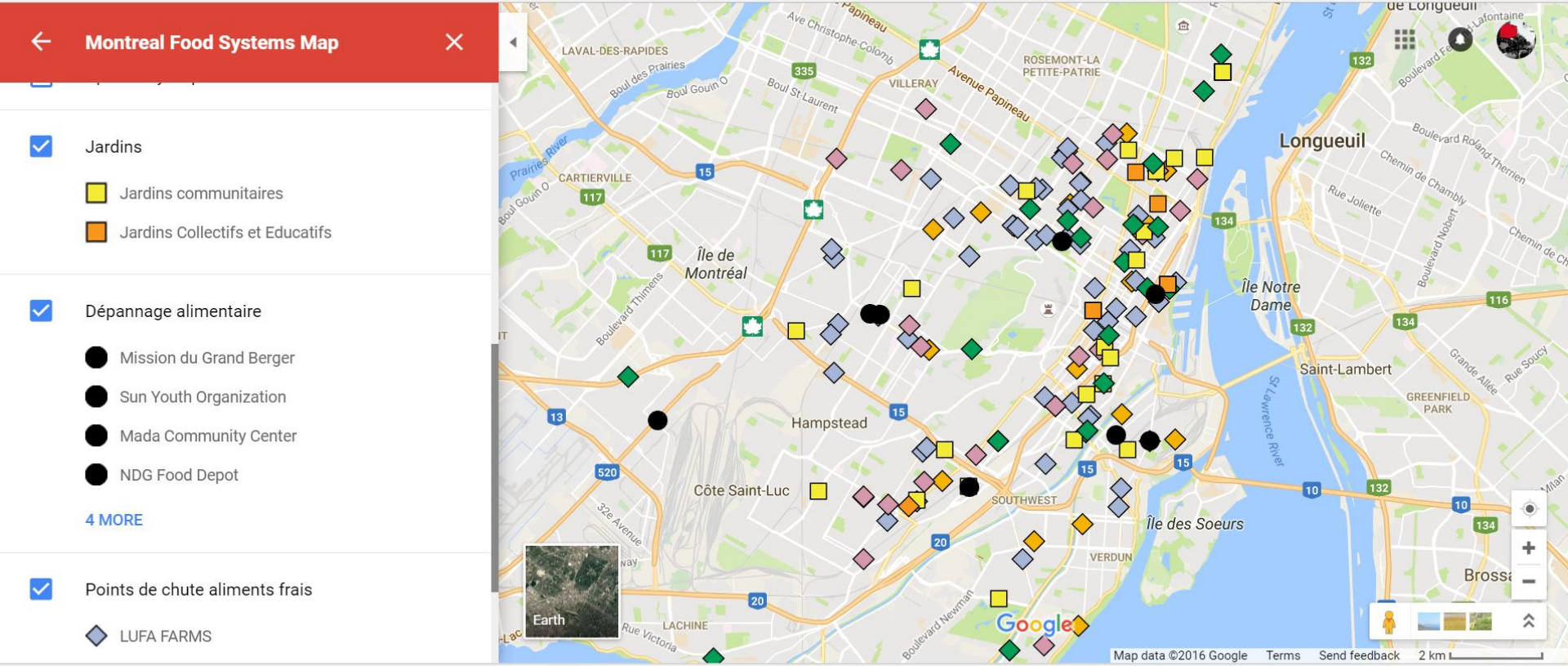
How to spot it?

They are easily recognized by the bright yellow to orange color and the cuneus on the hemelytra. Nymph is green. Size is less than 1 cm.

Why are they bad?

this plant bug is a general phytophagous that feeds on more than 200 plant species, including over 50 crop plants (strawberry, cotton .etc), causing deformity in plants and fruits.

Very hard to control. White sticky trap is effective. Spraying requires timing depends on plant. Small damage is inevitable. (1),(2), (12)



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2013

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