# Utilizing Hydroponic Systems to Optimize Food Production in Salt Lake City, Utah

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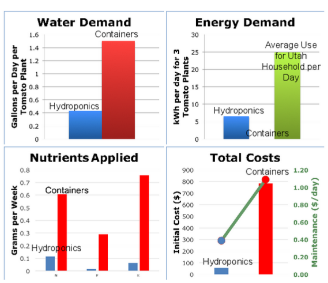
## Introduction

- The **objective** of this project is to further understand how to sustainably produce food in Salt Lake.
- Traditional agricultural practices in Salt Lake are difficult due to limited water and land availability, a semi arid climate, and cold, snowy winters.
- Hydroponic systems could eliminate those issues because they require less area and water and can produce food year round with the use of grow lights.
- The drawback of hydroponic systems is that they require more energy and nutrient input than traditional agricultural practices.
- This project expands on two previous projects:

**Project 1:** A variety of crops were grown in outdoor containers with the overall aim to quantify the requirements of urban agriculture and to understand its potential impact on the civil infrastructure in the city.

**Project 2:** Water and energy requirements for food production were quantified when using a hydroponic system. The data was used to decide whether snow capture and solar panels could satisfy the demands of a hydroponic system large enough to grow an individual the recommended amount of fruit in Salt Lake City.




## Methods

For this experiment we set up three growing environments: indoors with grow lights, in a greenhouse, and outdoors on a roof. In each environment, we had triplicate plant samples – 3 kale plants in hydroponic systems, 3 pepper plants in hydroponic systems, and 3 pepper plants in soil.

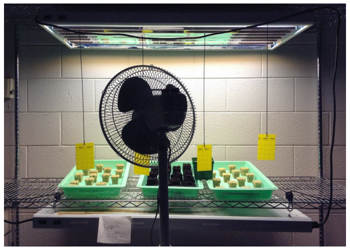


Figure 1: The kale and pepper starts indoors, under a grow light, with a fan to prevent transplant shock.

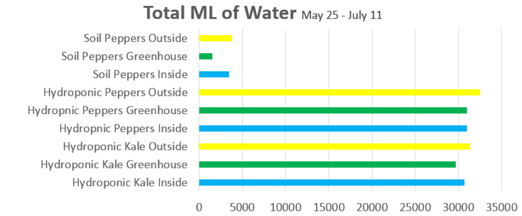
Figure 2: Kale and pepper plants in hydroponic systems indoors with grow lights.

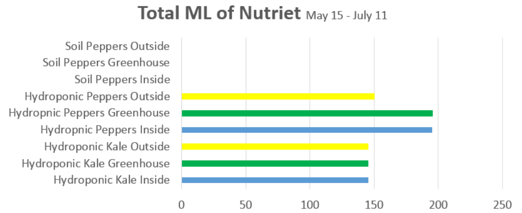
Figure 3: Kale and pepper plants in hydroponic systems, and pepper plants in soil in the UofU biology greenhouse.

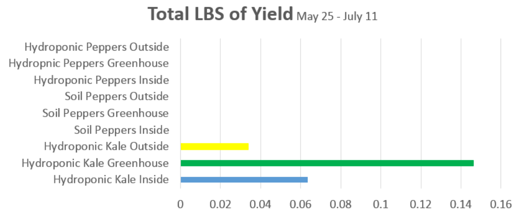
We measured water consumption (in milliliters), energy consumption (watts per day), nutrient input (milliliters), and produce yield (pounds) for each plant.

## Progress

Thus far, plants in the hydroponic systems have used more water, energy, and nutrient input but have matured faster than the plants in soil. Plants in the hydroponic systems produce more yield per water, nutrient, and energy input. I hypothesis that trend will continue. This information can be used to understand how to sustainably grow food in Salt Lake City.

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