Gallatin Valley Food Bank Garden Project

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INTRODUCTION

The Gallatin Valley Food Bank serves the greater Bozeman area through its main facility in town, and through the Belgrade and satellite Three Forks and Big Sky locations. In the last year alone, the food bank processed almost 2 million pounds of food, made only possible by large amounts of volunteer labor and generous donations. Most of the donations come from daily shipments of food that is past the sell by date, but is still consumable. These shipments come from several of the larger grocery stores in town such as Walmart and Safeway, and also many smaller participating locations. As such, the nature of these donations consist of primarily non-perishable food items and canned or boxed goods, and a family that relies on the food bank can have a diet lacking a healthy amount of fresh produce.

This problem is addressed by the back garden project, located directly behind the main facility building in Bozeman. As the current project yield does not fully satisfy the fresh produce needs of the food bank, I was brought on to investigate whether or not the project could be optimized in several ways, including man-hour efficiency and produce yield. My primary method of increasing efficiency was through the creation of an irrigation drip system, which would reduce the water draw of the garden, increase water availability to the crops, and reduce the required labor for watering the garden. Weather cataloging and precipitation recording were also investigated as a method of increasing efficiency. This will result in more fresh produce being directly available to the food insecure families of the greater Bozeman area, improving dietary quality across the board.

Manual host watering was last seasons method of irrigation. This method requires a significant amount of man hours, especially with the size of the garden project and only one available hose/water source. This method also uses the most amount of water while as only some actually reaches the crop roots

This is an example of the proposed drip system at work. Water is delivered by small ground level pipes with intermittent emitters. This system uses the least amount of water as it delivers directly to the soil and emits slowly for maximum availability to the crop roots, and only needs to be switched on and off for irrigation, required minimal man hours.

METHODS

The primary method of utilized in this study was the design, construction, and installation of a custom drip irrigation system. Measurements of the garden plot were taken, from which it was determined that six rows could be accommodated, each containing three separate drip lines and a one foot walking path between each row. Drip tube and valves were ordered online from Dripworks®. PVC ¾" pipe was used to build the primary frame for the irrigation system, with threaded ½" T adapters spaced to where the drip lines would branch off from. The frame was then cut into three 7' pieces and fitted with threaded adapters so it could be disassembled and reassembled at the end and beginning of growing seasons. From each T adapter, a ball valve was attached directly to the frame, with 75' of drip tape coming off that ran the entire length of the garden. This allowed for each individual row to be opened or closed independently. The end of the frame was fitted with a hose adapter, allowing it to attach to the previous hose that came of the water pump utilizing rain water, thus not requiring a new water source.

Use of a weather and precipitation recording system was explored, however the man hour cost to maintain accurate and complete records, not to mention extrapolating meaningful data from those records, was too high for the minimal expected benefit.

Completed drip system after installation. Water and pressure are provided by a small electric pump that is in turn fed by a large water tank hooked up to the rain gutters of the Gallatin Valley Food Bank building. Minimal planting currently with no crop growth visible yet.

Each drip line is joined to the frame by a ball valve that allows for individual control of each line, including the ability to control the pressure of each line.

PVC frame that connects the drip lines to the water source. Seen in the background is the water pump connected to the water tank, which is in turn connected to the rain gutters of the food bank building.

RESULTS

The drip irrigation system worked exactly as it was expected to. Less water was consumed as the drip tape delivered water directly to the site of the plant roots as opposed to the broad spread of a garden hose attachment. Each watering was more effective for irrigation as it acted as a slow release system, allowing time for the roots to absorb the water by saturating the soil in a span of minutes instead of just seconds. There were no records of previous crop harvest so there was no way to numerically determine if this year's harvest was increased, nor would there have an opportunity to collect sufficient data to correlate any increase in yield to the irrigation technique alone.

The number of man hours required to irrigate the garden each day was significantly reduced, requiring only the pump to be turned on and off. No training was required for any of the Gallatin Valley Food Bank staff to operated the irrigation system to its simplicity, and also due to the fact that it utilized the preexisting water pump.

Garden project as of July 12th. Drip system has remained in place with no maintenance and has achieved successful irrigation. This irrigation system can be removed and compacted for easy storage for future growing seasons.

DISCUSSION

Use of a weather and precipitation record system was not pursued for several reasons. First was the lack of data from previous seasons. This would mean that any meaningful data could not be derived until several years down the road when a database had been developed, and as this study only took place over part of one summer it would have been impossible to make it a part of this study. It would also have been very difficult to gather the required data that would have been sufficient to determine the effect of the irrigation system change on the crop yield alone, or in other words accounting for every other variable, including seasonal variables, planting times, and particular volunteer labor details. The inconsistent nature of the crops planted season to season would also have made it very difficult to conclude any meaningful results.

CONCLUSIONS

The garden project at the Gallatin Valley Food Bank has been made more efficient as a result of the efforts of this study, confirming the hypothesis as to whether or not the garden project could increase yield and decrease man hour cost. The methods used in this study were both simple and cost effective, which means that this style of streamlining amateur agriculture projects can easily by reproduced in a large variety of other areas. Other Gallatin Valley Food Bank locations can utilize this system to create a more sustainable supply of fresh produce to food-insecure residents within our community. This system could even be expanded to serve on the proposed 10 acre plot that the Gallatin Valley Food Bank has acquired and is planning to raise crops on.

FUTURE WORK

Data will be collected form local area supermarkets and grocery stores to determine an average price of locally grown produce of specific crops. This list will contain crops that have been grown at the Gallatin Valley Food Bank garden, and when referenced with the poundage of produce harvested will give the food bank a dollar value of the food provided by the garden. This will be very useful as the food bank uses pounds as their main record keeping unit, and a monetary value assigned with the garden will help justify and perhaps even increase funding for the project.

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