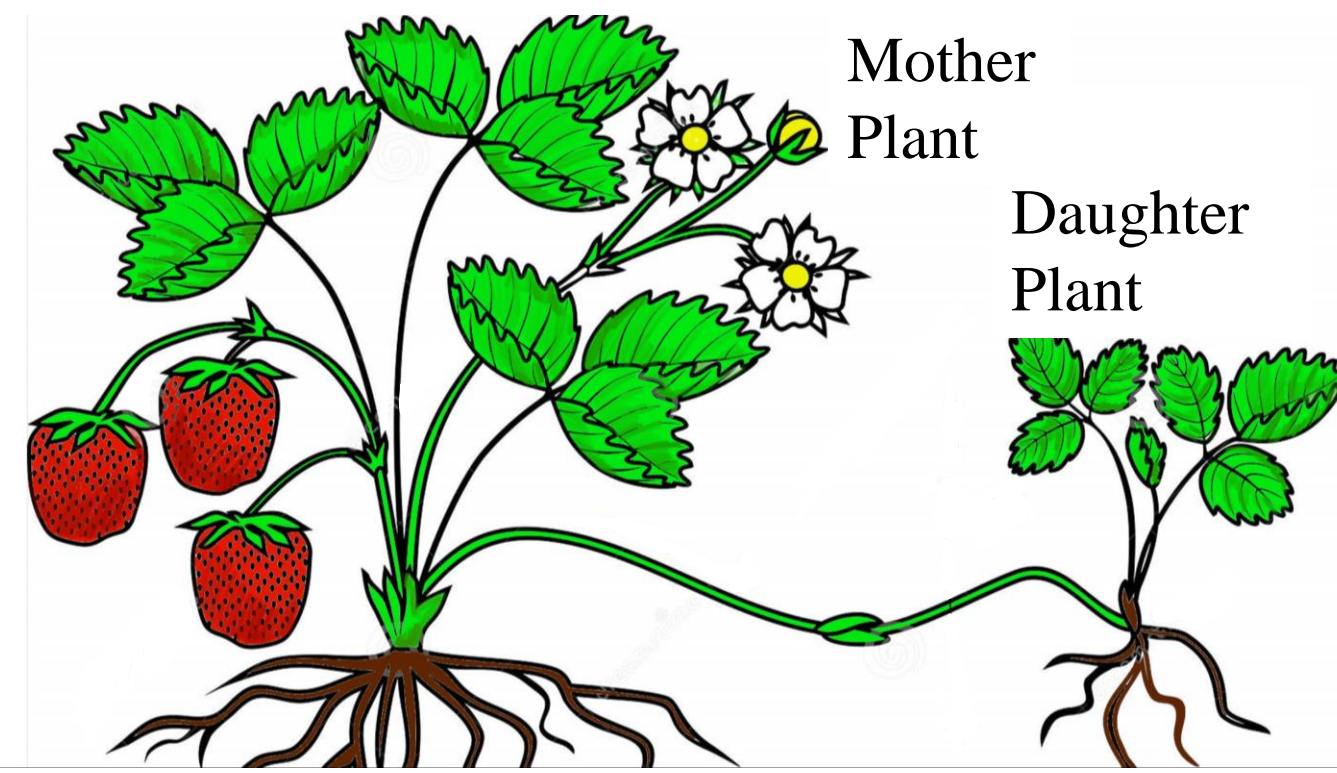


Introduction

What Strawberry runners are vines sprouting off the strawberry plant creating daughter plants and **takes away energy from producing yield.**



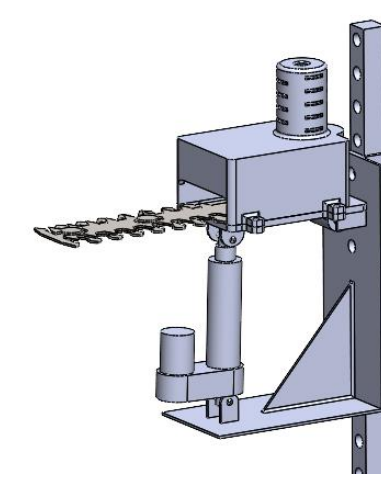
Why The current methods of cutting and collecting runners are **labour intensive** and **time consuming**. The current process **takes 9 hours per greenhouse**, there are currently 22 greenhouses.

Preliminary Concepts

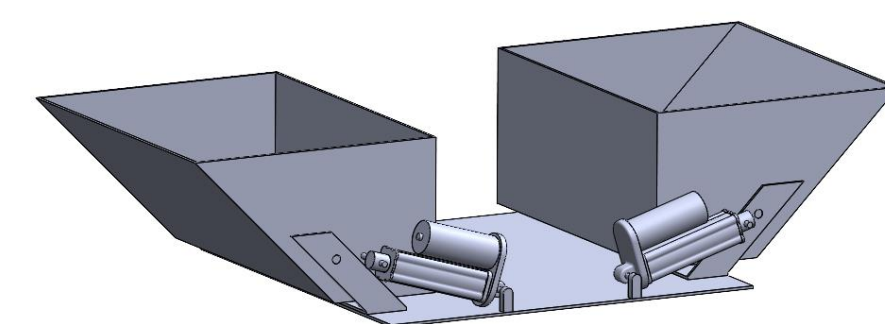
Burro UGV
The Burro is a propulsion platform using machine vision and GPS to navigate. Cost of \$20,000 CAD + annual maintenance of \$2,200 CAD.



Gyroscopic Auto-Leveling
Auto-levelling system using feedback from gyroscope to change the relative angle from the UGV using a linear actuator if potentiometer feedback.



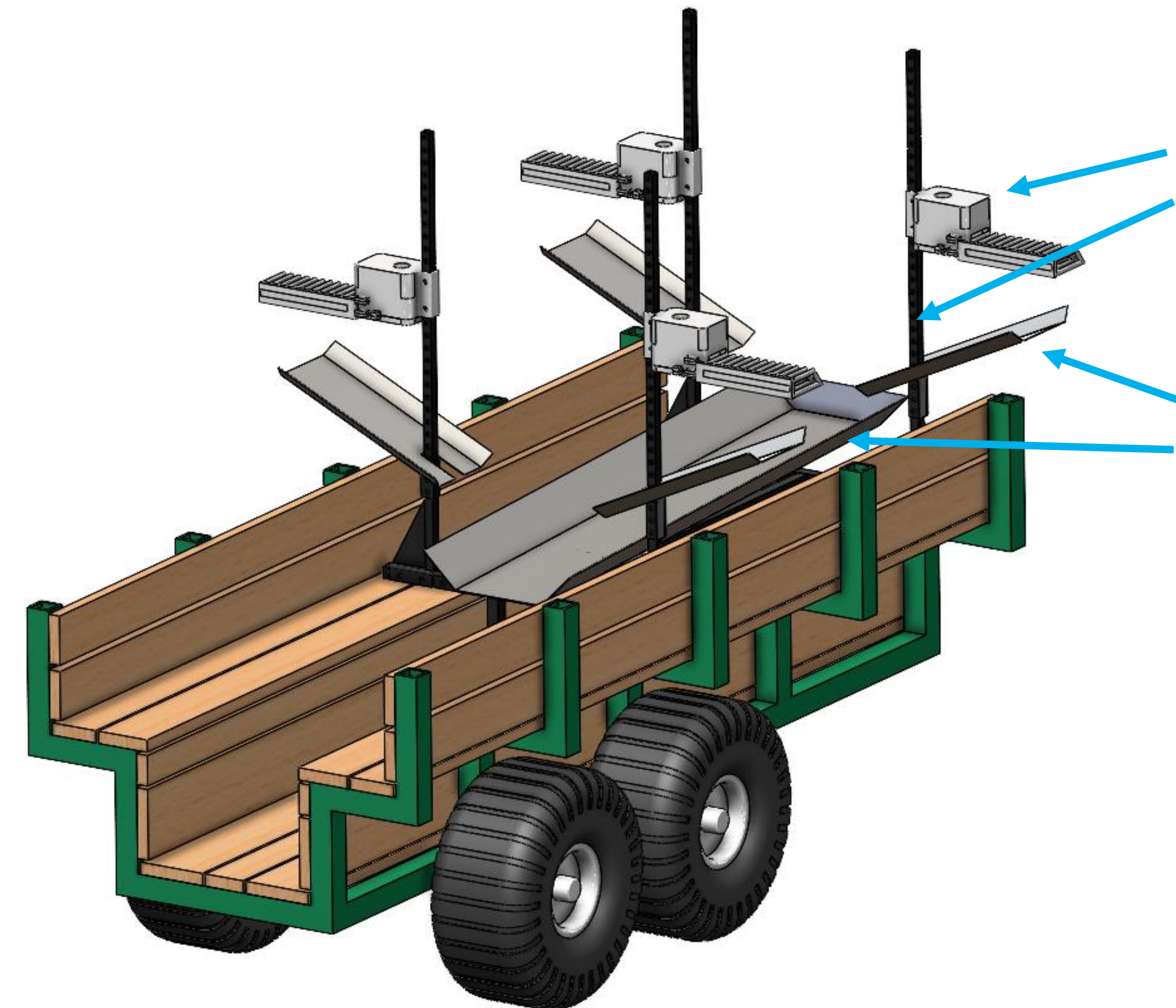
Side-Mounted Collection
A collection bin designed to be mounted on top of a UGV. Positioned under each trimmer, the bins would rotate 90° to dump.



Design Requirements

- 1 Apparatus must fit within confines of wagon.
- 2 Trimmers must trim all strawberry runners and collection system must collect all trimmed runners.
- 3 Electrical components must be confined and protected from the environment.
- 4 Apparatus must break even with cost within one year projected from savings.

Design Details



1. Trimming System

- Trimmer Enclosure.
- Modular Framework.

2. Collection System

- Deflection Plates.
- Collection Hopper.

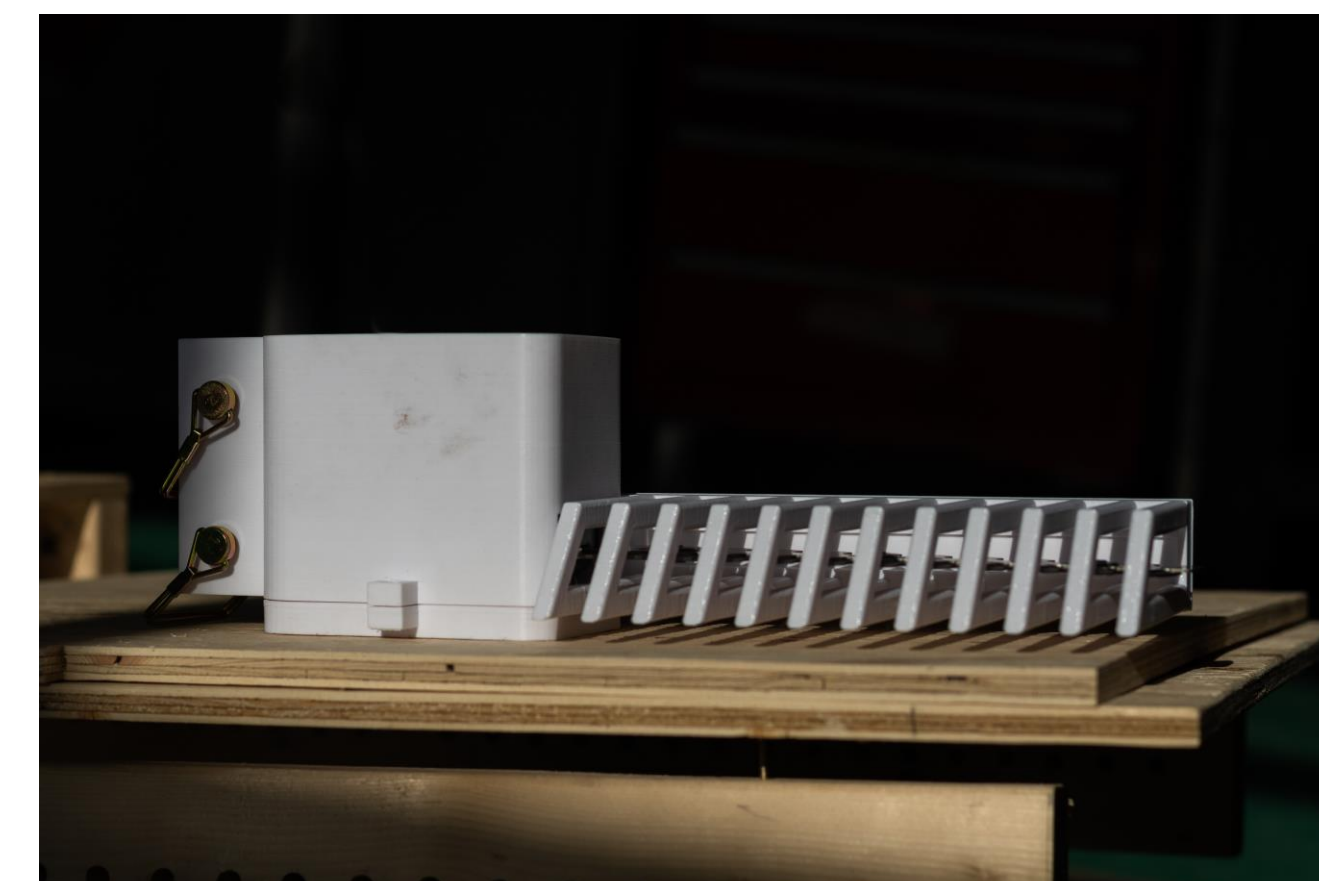
Budget - \$1513.24

- Electronics: \$1073.21
 - 4x Trimmers
 - 2x Pololu Motor Driver
 - Arduino + screwshield
 - 12-5v converter
- PETG Print Filament (3 rolls): \$106.91
- Metal Material: \$333.12
 - 1" square tube
 - 3/4" square tube
 - 1/16" sheet metal

Trimmer Assembly

Trimmer Enclosure

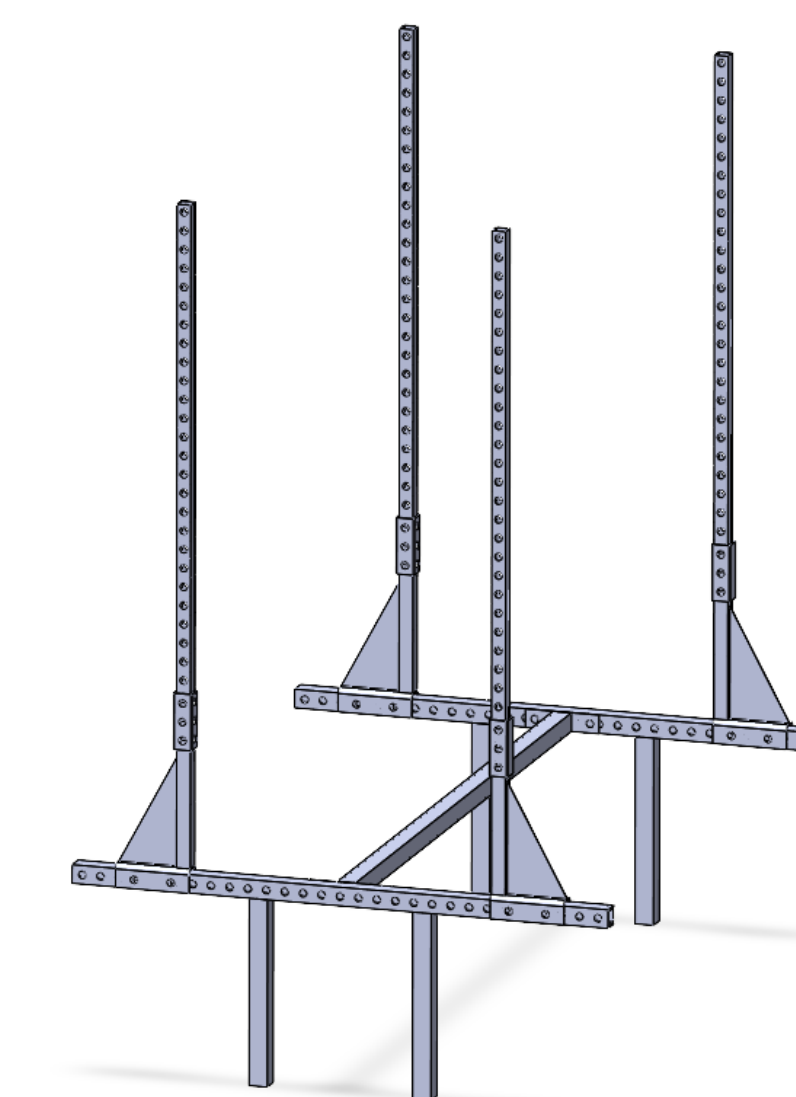
- Made with PETG for UV resistance.
- Adapted shear guard for safety and to reduce risk of jamming.



[Trimmer Enclosure]

Modular Framework

- Modular height and width adjustment.
- Adapt to different row widths and heights
- Transferrable to other platforms



[Modular Framework]

Collection Assembly

Deflection Plates

- Redirects trimmings to central collection hopper.
- Modular attachment to allow for different lengths of runner trimmings.

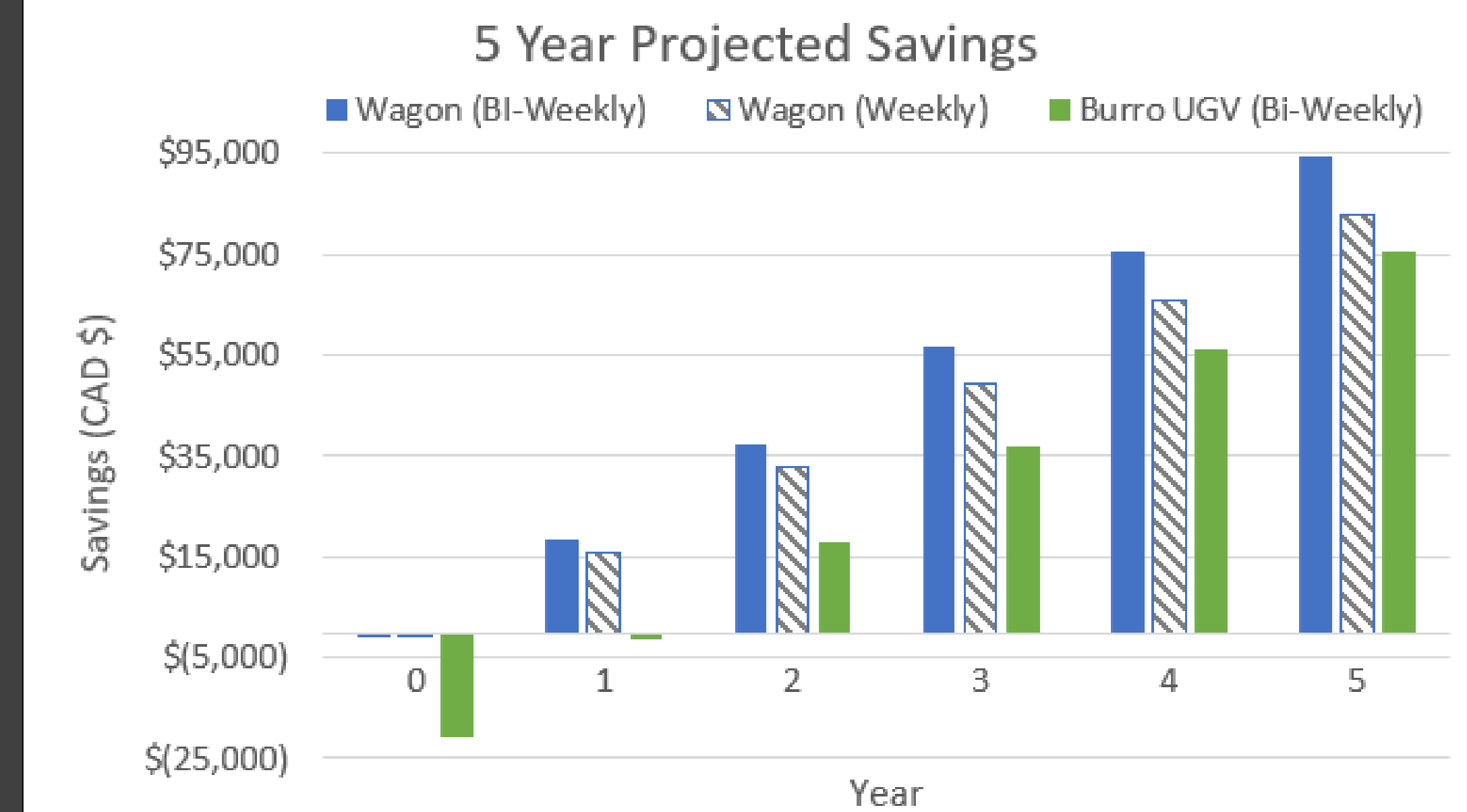


Collection Hopper

- Dumps using linear actuator with a switch.
- Collects fallen trimmings.

Results & Recommendations

The goal of this project was to reduce the costs associated with trimming and collecting strawberry runners. Our recommendations are based on a 5-year cost analysis of the different project alternatives. This analysis is based on the cost of manually trimming and collecting runners during a growing season, estimated at \$21,463. The Burro UGV and Wagon were both evaluated.



The cost analysis displays initial investment at year 0, with each subsequent year representing the cumulative savings relative to the manual labor cost. If cutting frequency is to increase from bi-weekly to weekly, the wagon costs will go up as shown, whereas the UGV cost only increases by charging requirements.

Recommendations

- Operate Wagon at weekly or bi-weekly intervals.
- Purchase Burro with wagon savings for long-term savings and automation of process.

Field testing will be completed before final project handoff.

Acknowledgments

A special thank you to Dr. Hector Jaldo, our contact at Country Magic and Dr. Travis Esau, our contact in the Dalhousie Faculty of Agriculture. Their experience and direction was vital to the success of this project.

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