Fruit Tree Shelter – GF2 Final Report December 2017
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Overview

We are very happy to report that our 2017 GF2 project goals to provide additional infrastructure to support our fruit tree research have been achieved. The new buildings we designed and constructed utilized materials efficiently and are providing the desired environmental conditions for the trees we have selected from our collection and planted within. We have increased our sample size of fruit tree cultivars by thirty percent, and look forward to being able to provide more rigorous data on relative productivity, survivability and transplanting success of long-containerised trees in the future. We are hopeful that information from this project will lead to commercialisation opportunities for unreleased cultivars and shelter designs to better serve the Yukon market.

In order to capitalize on best site conditions and personnel qualifications, some modifications were made to the original plan for 2 x 48’ modular low profile buildings. We decided to build one shelter to 60’ long (*Far West*), used two sections to extend an existing shelter from 48’ to 60’ (*West*), and chose to build a third small unit to 24’ to test a double wall (*Hot House*). These adjustments did not in any way limit or diminish the effectiveness of the project but added to it, giving a wider range of conditions to test. The larger shelter (christened *Dell’s*) was executed as proposed.

Dell’s

Erected in September of 2017 this 12’ x 48’ structure utilizes 13 wood trusses set on 4 foot centres. The sloped walls are 9’ and 10’ high on wood sills with a 5 foot span shed roof. It has a large door at either end and above these, wall to wall vents that pivot off-centre for additional ventilation. The building is oriented N to S to minimize midday heating and maximize afternoon/evening sun, which is the best light at the site; early daylight is banded shade from nearby spruce. Sloped walls and roof are covered in a single layer of 6 mil poly; vertical ends, doors and vents are double layer 6 mil. A second layer of poly is draped over the main walls and roof for the winter months to help moderate heat loss.

The site was cleared of brush and stumps early in the season and tilled repeatedly over the summer at ever increasing depths to warm and mix the existing soil strata. Soil is silt and sand with good organic content for between 24-30 inches above gravel. This was ascertained by working most of the site to these depths by hand to ensure good drainage. Overhead drip irrigation lines are installed to each of the 4 standard mature trees and one dwarf planted in the building.

The building is too new to offer many details, however we have seen -40 already this season and found the shelter to have low but adequate insulating characteristics, providing 15 degrees of moderation at these low temperatures with a foot of background snow.

Far West Shelter

Built in August of 2017, this 60' long, sloped-wall shed-roof shelter (the third of this series after *East* and *West*) utilizes design upgrades determined from previous shelters. End walls and doors are more solidly built and feature 6 mil poly on both interior and exterior faces to lower heat loss in winter. The wood header which the roof panels are attached has been simplified and fastened in a fashion that allows easy adjusting to level the roof should posts be upthrust by frost, a problem seen in the earlier units. Improved bracing is in place and a ground plate for the hinged walls to sit on has been added for wind stability. Anchorage has been upgraded to steel reinforcing rod pins. Small changes in the details relating to poly placement and attachment have been made to improve water flow off the panels to prevent premature decay of the wood and direct water into the root zones. Irrigation lines have been installed below the centre header, running above the trees to keep lines out of the grass where they had become a problem in earlier shelters. Feeder lines drop down to each tree as needed. All trees planted in this shelter are on dwarfing stock or interstems, most are about 5 years of age and beginning to bear fruit.

West Shelter

Extended from 48’ to 60’ in 2017 using improved designs, on a relatively level site with slightly siltier soil. Building houses 4 productive trees on standard rootstock and 4 younger trees on dwarfing roots. Two sites are available for further planting in 2018 (see tree notes). Irrigation lines have been moved from ground to ridge for better soil/weed management.

Hot House

The third and smallest shelter at 24’ long with same design as Far West, will have an inner layer of poly on the main walls in addition to the ends to explore the possibilities of extra insulation. The second wall has not been installed yet and planting will occur in the spring of 2018. We will shift one of our data loggers to this location for the winter of 2018-2019.

Tree Notes

As proposed, the large, mature trees were successfully moved and planted. Some of these have been grown in containers for 25 years. The winter of 2016-17 cost us many of our experimental dwarfs (by experimental we mean unreleased rootstocks and or cultivars from the University of Saskatchewan’s breeding program) – we hypothesise that early cold before insulating snow accumulated was the cause. The loss of a large number of one-year old trees that had been grown specifically for these shelters means that we still have a small number of spaces to fill. We have generated new trees for these sites and will fill them in 2018 once the young trees are large enough to plant.

Data Collection

Dell’s House has been equipped with a 4 channel thermocouple data-logger (Onset) that will monitor the inside temperature at 5 feet and ground level, as well as ambient outdoor temp at a similar height and ground level. The Far West and West shelters have each been equipped with a single-channel thermocouple data-logger to monitor air temperature in the centre of the shelter (˜3’ from the ground under the centre line). The ambient outdoor probe outside of Dell’s will be enclosed within a radiation shield before the sun returns and used as the outdoor baseline against which the other data series will be compared. All loggers are set to monitor temperature on an hourly basis.



Above - Dell's: Groundworks, moving the trees and planting


Far West: Construction and finished structure with trees planted and irrigation hung