

LFS 350

FINAL REPORT

Gambier Island: Row, Row, Row Your Apples - Part 2



EXECUTIVE SUMMARY

Nowadays, it is common that academics will express their concern for the adverse effects that monoculture orchards have on the resiliency of the apple species to adapt to climate change. This project addresses this issue of food security by maintaining the lineage of the heritage apple trees through grafting, ultimately contributing to the apple species' gene pool and finally adding to the resiliency of the apple species as a whole. The project also addresses issues of food literacy among the Gambier Island Sea Ranch (GISR) residents by adding to their knowledge of proper maintenance of apple trees, which assists them in securing a healthy food source. In fact, this Community Based Experiential Learning (CBEL) project was carried out with an objective to preserve certain 100-year-old heritage apple trees growing on Gambier Island (GI), which is located off the coast of British Columbia. These apple trees once contributed to the GI community's food security when they were maintained by apple orchardists dating back to the early 1900's, but have since been neglected and are at risk of fungal decay. To help meet the required objective, specific questions of concern helped guide the success of the project including, "what varieties of apples were best suited for the local microclimate on GI, what form of media is best received by the residents in regards to maintenance of the newly grafted seedlings, and using an Asset Based Community Development (ABCD) approach, what are the resources and assets available to the GI residents?" The objective was successfully carried out by using grafting techniques on individual apple trees that were most valued by the GISR residents, with a total of then apple tree scions being grafted onto vigorous M9 rootstocks. Upon conducting personal interviews with the GISR residents, it was determined that presenting the maintenance and care instructions in the form of an informative document would be best received by the residents. However, the specific varieties of the apple trees that were grafted were inconclusive due to the lack of available information, with the exception of one known banana apple tree and one known crab apple tree. Important and useful assets were determined to be the heightened sense of community and the commitment to preserving the heritage apple trees. Additionally, it was discovered that the GISR residents are well organized and have the willingness to take on the extra responsibility of maintaining the newly grafted trees. Lastly, some recommendations are suggested to potentially help in the preservation of the historical values of GI and to expand the community's food system by connecting with BC's food system. Overall, the project was successfully completed by accomplishing project's aims and objectives.

INTRODUCTION

Project's Background:

It has become more and more common for orchard farms to have monoculture plantations instead of polyculture ones. In fact, in British Columbia (BC) some commercial fruit farms grow up to 15,000 acres of apples trees of the same variety (Government of British Columbia, n.d.). According to Thrupp (2000), lacking biodiversity in the agricultural sector can discourage food security because the ecosystem in which the monoculture is established will not be sustained over a long period of time without the constant need for anthropogenic inputs. Thus, it is essential to find the necessary tools, including food literacy, to develop a better understanding of food security and address the issue. In this report food literacy is defined as “the positive relationship built through social, cultural, and environmental experiences with food enabling people to make decisions that support health (Cullen, et al., 2015).” Notably, “food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life (FAO, 1996).”

The GISR community on GI is located on the South East side of the island and consists of over 300 acres of land, where several historical apple trees can be found (Sea Ranch History, n.d.). In the 1900's the Hjorthoy family started an apple tree orchard business by planting over 1,000 trees (Cooper, 2006). These trees were utilized for commercial purposes, thus contributing to the Island's food security by providing a stable source of income and food (Sea Ranch History, n.d.). Unfortunately, nowadays only 1% of the trees can be found on the Island due to the lack of maintenance over the years (Cooper, 2006). Two GISR residents, Rosalie Boulter and David Darvil have addressed their concern towards the health of these apple trees that hold historical value amongst GISR residents and the Island itself. This is the main reason why they reached out to the Land and Food Systems (LFS) 350 class coordinator, Will Valley, as they wanted to help preserve their heritage apple trees (Boulter and Darvill, personal communication 2016). Thus, the main goal of the project was to rejuvenate the historical apple orchard by preserving the heritage trees with the use of grafting techniques and to furthermore strengthen food literacy among the GI residents with an information package on orchard maintenance. During this process an ABCD approach was applied by determining GI's assets and utilizing their best apple tree scions in the grafting process in order to regenerate them and retain their genetic lineage.

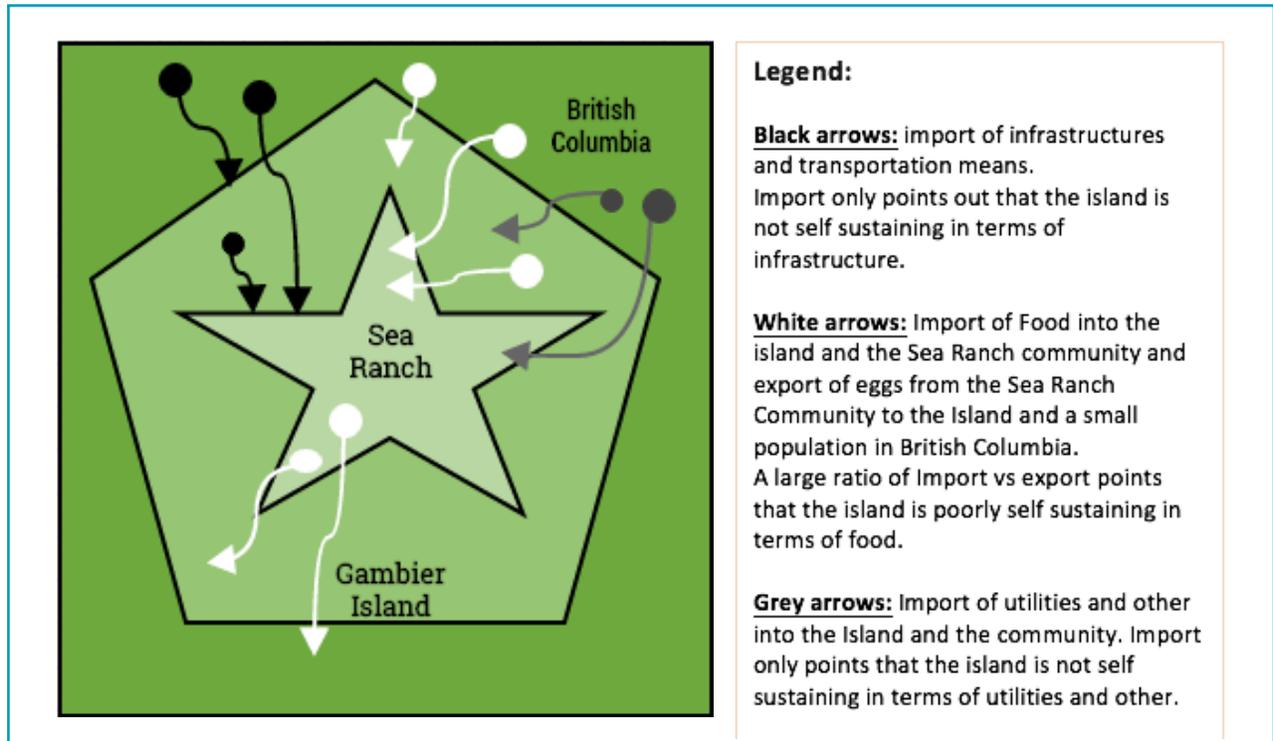


Figure 1. GISR's interactions with Gambier Island and British Columbia.

Project's Significance and Limitation:

By using the framework and approach cited above, the notion that behaviours and skills cannot be separated from their environmental or social context was upheld (Cullen, et al., 2015). This partnership can benefit GI as it will help to empower them to create their own food and preserve their community and heritage so that it can be passed on to generations to come. The technique known as grafting is important because it has a high success rate and allows one to take one tree species and essentially give it a new life (Asahh et al. 2010). A study by Asahh et al. (2010) supports the popularity of this technique and demonstrates that there has been a lot of success in rejuvenating other selected species. Advantages of grafting when compared to other planting processes include cost efficiency, high yield productivity (Reader, 2015) and also tolerance of environmental stresses by enhancing plant physical strength (Goldschmidt et al., 2009). Therefore, the grafting technique will be helpful for GI as it gives a high chance of success in preserving the Island's historical orchard for generations to come and in the conservation of their heritage and traditions. Most of the literature available about apple tree grafting and care for an orchard is either in general terms or relevant for a specific region. Gaps

between literature and our goals for this project is thus identified to be a lack of specific local knowledge on growing sustainable and healthy apple trees within the specific microclimate of GI. Furthermore, there was a lack of knowledge pertaining to the specific tree varieties used in the grafting process due to the limited information available to the GISR residents and the lack of resources necessary to determine such information. Therefore, conducting research and creating an educational resource for the residents of GI is important, as it will address this gap and help to enhance food literacy among the GI residents. The documented resources with instructions on the proper processes of apple tree grafting and the care and maintenance of the newly grafted trees will allow the GI community to preserve their heritage orchard and provide them with another means, aside from oral communication, to pass this knowledge on to future generations.

Project's Aim:

To utilize the technique of grafting in order to preserve apple varieties from the heritage apple orchard, contribute to the gene pool of the apple species and curate educational material for the on-going maintenance of the GI orchard.

Project's Objective:

To support the GISR community's efforts to preserve their historical fruit trees by completing the successful grafting of ten apple tree scions onto healthy rootstocks and determining the most effective way to present information for the GI residents in order to help them maintain their orchard.

Project's Inquiry Questions:

- ❖ What are the specific varieties or trees that the island wants to preserve through grafting?
- ❖ What media or approach to presenting information about orchard maintenance would be best received by the GI residents?
- ❖ Using ABCD approach, what are the resources and assets available to residents on GI?

METHODS

Communication was established with all key stakeholders involved in the CBEL project to ensure our group was well equipped to meet the objectives and goals set out by our community partners. Prior communication was an essential measure to ensure our community partner's ethical considerations were being upheld.

Approach to Presenting Information on Orchard Maintenance and Care:

Collaborative skype interviews were conducted on January 18, 2016 with our community partners. As previously mentioned, this was carried out in order to gain a better understanding of the GISR community's objectives, goals and ethical considerations. Follow up emails were maintained on a bi-weekly basis to ensure sustainment of continuous communication throughout the term. Interactive meetings were set up throughout the term with Dr. McArthur, a horticultural professor at UBC, where proper grafting techniques were communicated, demonstrated and discussed. As well, extensive academic literature research on proper grafting techniques was carried out. These interactive experiences and self-directed research facilitated the understanding of how to properly collect, store and graft apple scions from the GISR. Furthermore, it was identified that the most appropriate media to communicate information on apple tree maintenance and techniques of apple tree grafting to the community partners was through detailed documentation. Therefore, a comprehensive research document with specific and helpful external resources was created.

The Specific Varieties of Trees, Procedure and Data Collection:

During our visit to the GISR community approximately five-ten scions were collected from seven unique apple trees. The aim was to cut scions approximately 10 mm in diameter (about the size of an average pinky) with healthy spring buds.



Figure 2. Example of an apple tree scion collected from GI.

After the scions were collected from an apple tree isopropanol was used to disinfect the pruning shears used. This was an essential step in our technical procedure as it prevented any potentially diseased scions from infecting healthy scions. Due to the lack of information available, only two out of the seven tree species were identified. One being a winter banana tree and the other being a crab apple tree. Thus, the scions were then labelled using a numbering system according to their corresponding tree.

It is important to note that each scion was chilled and stored at 4°C to ensure the integrity of the plant's cell before the grafting process was completed. One week after the visit to GI each scion was cut at a 45° angle and a “tongue” was shaped to a corresponding rootstock (M9). Parafilm® was then used to wrap around the fused scion and rootstock to prevent desiccation and protect the wound from pathogens. This is a necessary step to better ensure the success of a continuous vascular connection amongst the scion and rootstock and enhance proper plant growth.

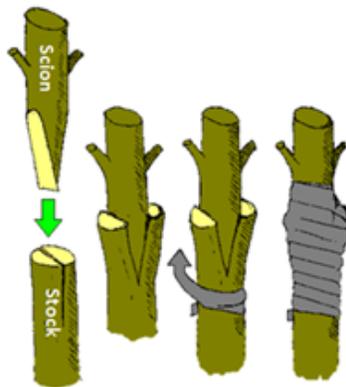


Figure 3. A visual of the grafting process (Taylor, 2013).

Resources and Assets Available on the Island and Ethical considerations:

Due to of the qualitative nature of the project, quantitative data analysis was limited. However, the trip to the GISR was heavily documented with extensive journal entries and photographic journaling. Perspectives of our community partners, Rosalie Boulter and David Darvil, were respectfully listened to in an attempt to better understand their strengths, assets and aims as a community. Using an ABCD lens the importance of promoting food literacy knowledge within the community was expressed. This will allow the GISR residents to develop within and build upon what already exists within the community – “as a community for the

community” (LFS 350, 2016). Additionally, oral consent was given by the community partners to include the information that they shared in the final report.

RESULTS

Specific Varieties of Trees and the Grafting Process:

Scions were collected from GI heritage apple orchard on February 27th, 2016. The specific varieties of the apple trees that the scions were taken from were unknown by the GISR residents, with the exception of two trees, therefore scions and trees were labeled using a numbering system. The two trees that were identified were a crab apple tree (tree number two) and a winter banana tree (tree number five). A total of five-ten scions were collected from seven different trees. The trees labeled one to four were of special request to be utilized for the grafting process from the GI community partners and the other three trees were taken from trees that looked viable. When executing the grafting process, it was determined that tree number three and four had vascular disease and could not be grafted onto rootstocks (see figure 4. below). Furthermore, scions collected from tree number seven were not viable for the grafting process due to scions being an inappropriate size. A total of ten scions were successfully grafted onto M9 dwarf rootstocks. The number of scions, variety name and challenges from each tree are summarized in Table 1. below. If these newly grafted trees start to bud it will not be determined until two to three weeks after the original graft date of March 16th, 2016. As of April 6th, 2016 there was signs of budding in sixty percent of the grafted apple trees.



Figure 4. Vascular disease of scions’ number 3 (left) and number 4 (right)

| Tree Number | Tree Variety | Number of Scions Grafted onto M9 Rootstocks | Challenges |
|--------------------|---------------------|--|--------------------------------|
| #1 | Unknown | 3 | N/A |
| #2 | Crab Apple | 3 | N/A |
| #3 | Unknown | 0 | Vascular Disease |
| #4 | Unknown | 0 | Vascular Disease |
| #5 | Winter Banana | 2 | N/A |
| #6 | Unknown | 2 | N/A |
| #7 | Unknown | 0 | Scions were not the right size |

Table 1. Number of scions, variety name and challenges from each tree.

Approach to Presenting Information on Orchard Maintenance and Care:

It was determined through communication with the community partners that the best and most appropriate way to present information on apple orchard care and maintenance of the new seedlings was through a well organized word document that also contained links to specific external videos and other helpful sources. This was successfully completed and is included in the appendix of this report.

Resources and Assets Available on Gambier Island:

Through the onsite visit to GI it was determined through observations and communication with the residents that their greatest assets are their strong community and their willingness, determination and hard work ethic. Additionally, they proved to have an admirable dedication to preserving their heritage apple orchard, which is key to the success of the newly grafted trees.

DISCUSSION

Clear objectives were set out to preserve the genetic makeup of heritage apple trees on GI by grafting their scions and presenting the GISR residents with information on how to care for the new apple seedlings in order to contribute to food security and food literacy, respectfully. The heritage apple trees on GI are showing signs of fungal infection and the loss of these heritage apple trees and the genetic lineage their DNA contains decreases food security on a local and global scale. A growing number of studies and farmers’ initiatives reveal that genetic

diversity of apple varieties are depleting and is fundamental to agricultural production and food security, as well as being an ingredient in environmental conservation (Thrupp, 2000). The successful grafting of trees one, two, five and six will result in the conservation of their genetic makeup and the DNA of these heritage apple trees will continue to contribute to a more food secure future. Information in the form of a document relating to the grafting process and care and maintenance of apple trees was presented to the GISR residents with visuals and links to useful internet sources in order to contribute to their community's food literacy. The Environmental Youth Agency (EYA) has found that when individuals learn about where their food comes from and how to create, care for, and maintain an orchard they gain positive feelings towards food (BIA partners with EYA on orchard project, n.d.). A portion of this project educates the GISR residents in maintaining the trees enabling them to secure a local food source and increases their food literacy.

Known for implementing sustainable economic development, Ernesto Sirolli defines a successful community project as one that values community input and understands the importance of community consultation (Ted Talk, 2012). With this in mind, an ABCD approach was used by focusing on the assets of the GISR, which were identified by interviewing GI residents, listening to what their goals for the project consisted of, and by participating in an onsite visit. Assets include, but are not limited to, residents possessing strong commitment to community building, organized and similar goals towards the maintenance and care of the island itself and the GISR residents, and the collaborative motivation in conserving the history of the Island and the heritage apple trees. Upon conducting interviews with Rosalie and David, our findings suggested and revealed the importance of the successful grafting of these trees, as it will empower the GI residents to create their own food source, while also enriching their community and preserving their heritage in order pass it down to generations to come.

Limitations:

Limitations were encountered when trying to answer the first question about determining the apple varieties growing on GI. Information that could help determine the varieties was limited to verbal communication from only two GISR residents (Rosalie and David) and from the information retrieved by previous projects conducted by other LFS students (Caecilia, Carly, Carol, Cheryl, Joyce and Terry, 2015). Additionally, time was limited and the recourses necessary in order to look deeper into the apple varieties found on the island were not available. Notably, the GISR residents were especially interested in preserving four specific apple trees of varieties unknown, but that showed enhanced signs of productivity and fruit bearing capabilities.

The successful grafting of these trees onto healthy rootstocks was limited due to tree number three and four showing signs of vascular infection and therefore could not be grafted onto rootstocks. Unfortunately, because of this the requests made by the GISR community partners could not be fully met. Finally, having been limited to only one onsite visit, with limited GISR residents present, specific assets made available to the community may have been missed. For example, Rosalie mentioned the professions of some of the GISR residents (i.e. doctors, architects), but the limitation in not being able to talk to these residents directly impeded the possibility of revealing hidden talents among residents, such as interests in horticulture, agriculture, or gardening that could be considered a great asset to the Island in preserving the newly grafted apple seedlings.

CONCLUSION

In conclusion, by using an ABCD approach the resources and assets available on the Island allowed for the successful completion of the aims and objective of this project. The technique of grafting was utilized in order to preserve apple varieties as ten scions were successfully grafted on to M9 rootstocks. Additionally, a word document that included links to external resources and video tutorials was created in order to efficiently present information about proper grafting techniques and orchard maintenance to the GI residents. The variety of information and resources that was presented through this CBEL project will hopefully help to enhance the preservation of historical values, food literacy and food security on the Island.

Recommendations / Suggestions:

The apple trees had visual signs of stunted growth due to the lack of pruning and trimming over the years. Annual pruning, trimming and fertilizing is suggested for the future maintenance and also for a better chance of a successful graft union. Additionally, the lack of information about apple varieties and resources was one of the observed limitations. If interviews with more residents could be conducted it may be helpful to find more assets and resources available on the Island. Therefore, interviewing more residents and finding more resources could be used to determine the apple varieties in the future.

As it was suggested from the previous LFS 350 group in part 1 of the project, it would be more beneficial to GI if they had a wider connection with BC's food system. According to BC Food Systems Network (n.d.), one of their missions is to create food security for the residents of BC by getting communities involved in taking actions relating to food. Through this network

they share strategies or ideas during annual meetings, various events and social media. BC Food Systems Network can be an additional source to helping create healthy and sustainable food systems to the Island, and assist in rebuilding the community's food systems (BC Food Systems Network, n.d.).

Overall, based on observations and communication, it was identified that the GISR has a strong community in which they work together effectively to maintain the integrity and history of the Island. With the proper care and maintenance of the newly grafted apple seedlings, food literacy and security on the island can be enhanced, while also conserving the historical values of the Island and the genetic makeup of their heritage apple trees.

CRITICAL REFLECTIONS

Student 1:

What:

The CBEL project to Gambier Island as well as the collaborative flexible learning seasons were truly memorable experiences throughout the term.

So What:

I've always held the notion that experiences are much more memorable than theoretical knowledge. I will likely remember the trip to Gambier Island for decades to come because I was out in the community facing practical experiences as opposed to memorizing theoretical information. As well, the learning sessions gave us time to work collaboratively with our group to complete projects, communicate with our community partners and key stakeholders and study/discuss key ideas with one another. These sessions were especially important to my learning as they facilitated the development of my communication and teamwork skills. The CBEL project itself was especially useful in acquiring new knowledge of the plant sciences. Being that I am currently enrolled in the dietetics major (and have involved in community food banks and kitchen programs in the past) this was a new and exciting experience for me. However, some aspects of my learning were somewhat challenging. I think the most challenging aspect of this course was in setting up education sessions with some of our key stakeholders.

Now What:

With five people to a group and multiple stakeholders involved it was challenging to get everyone on the same page. However, in the end we managed to coordinate the project well based on our repetitive/continuous communication throughout the term. These experiences have better developed my teamwork and communication skills that I can implement in further academic and real world situations.

Student 2:

What:

I have really enjoyed working with the Gambier Island residents on our CBEL project this semester through LFS 350. I believe this project has been a very valuable, memorable, and an influential experience that has contributed greatly to my knowledge base. I also found the flexible learning sessions to all be very helpful, even if we did not meet as a group on that specific day it made up for the other days that we spent on the Island or grafting the trees. When working on a group project it is so important that all members do an equal amount of work and have good communication skills in order for the project to be enjoyable and successful. I found working with this group to be excellent as we were all on the same page and collaborated very well with each other. Each member was willing to put in the work and we were all available when we needed to connect with one another on certain things. Moreover, our community partners were very helpful and displayed great hospitality when we visited their community on Gambier Island.

So What:

I am a very hands-on learner and this project really gave me the opportunity to learn through this forum, which was really helpful to me. Learning visually and first hand will help me to remember the information and skills a lot longer than I would have if I had read it in a book somewhere. Furthermore, through this project I was able to practice many of my skills and also enhance my knowledge greatly. I was able to learn about how to effectively work with multiple stakeholders, about the Gambier Island community, the science behind caring for an orchard, how the grafting process works and certain skills on writing scientific papers.

Now what:

Overall, I had a great experience working on this CBEL project and I believe it was a great success for all members involved in this project. Although this type of project is not the normal type of assignment in most classes, I though it was very effective at teaching me valuable lessons, which I can now carry with me throughout the rest of my life.

Student 3:

What:

LFS 350 is unique in that this course offers flexible learning hours during regularly scheduled class time in which our group was able to work together to meet the goals and objectives framed within this grafting project. During this time, we were given the responsibility of creating our

own timeframe, deadlines, arranging meetings with community partners, embarking on a trip to Gambier Island and grafting ten apple seedlings.

So What:

By efficiently using this time and actively using online platforms such as Google docs, Facebook and Skype our team was able to create and present an organized and intelligible project that contributes to the greater cause of food security. This project is equally valuable in that it taught me a lot about teamwork and the benefits and challenges that come along with working with partners and stakeholders with multidisciplinary backgrounds.

Now What:

Nearing the completion of our project I am pleased to report that our team worked very well together by maintaining clear and open dialogue, being respectful of each other, and learning from each other. Having engaged in a CBEL project alongside four other students and multiple stakeholders has proven to be both challenging and rewarding. This project has enriched my academic experience at UBC by offering me an opportunity to step out of the classroom and gain hands on experience while exercising the knowledge and skills I have gained over the years.

Student 4:

What:

Throughout the term the CBEL project, group work and flexible learning sessions have been enjoyable experiences.

So what:

The CBEL project was a memorable experience because I actually went to Gambier Island and experienced the “real-world” problem first hand rather than learning theoretical information from textbooks. Also, visiting GI has definitely enhanced my learning experience because by meeting with our community partners, our group was able to find extra information about the island and the community that we could not find on the Internet or other sources. For group work, although we all came from different fields of studies, it has been beneficial to the group as we all contribute different perspectives. Additionally, group work has strengthened my learning experience because as a group, everyone was willing to put in all their effort and was open to helping one another. We all made sure that we were on the same page and worked it out. Also, flexible learning sessions were really helpful. During the sessions, group members were able to talk to the Community partners and were able to find out some issues that we had not noticed

before. Therefore, we could efficiently do what we needed to do and what we were asked to do. The flexible learning sessions were useful to all of us because we used that time to plan out the next steps, discuss any uncertainties, and further communicate with each other.

Now what:

It has been a great experience because we were able to partner with a great community, help with food literacy and security, and increase our knowledge at the same time. I have learned how to communicate with other group members, how to use time wisely and how to work individually as well as work in a group environment. I hope that I can apply those experiences to the future ahead of me so that I can be successful in various ways.

Student 5:

What:

Working on the Gambier Island Sea Ranch CBEL project with my fellow group members was probably one of the most rewarding experience I had during this academic term. The project itself had many aspects that will allow me to remember it throughout my degree at the University of British Columbia (UBC). I was also lucky enough to have worked with my fellow teammates. We all were excited that we got our number one choice, which helped us contribute to the project equally with enthusiasm.

So What:

This project not only gave me a better sense of what Food Literacy meant, but I was also able to observe its effects on the Sea Ranch community. During my LFS 350 experience, I was able to learn interesting concepts in a classroom as well as build on it by applying it during our flexible learning days. Flexible learning days were definitely the most interesting and fun teaching methods in this class. With my group mates we travelled to the GISR community, where we were able to meet people from the island and have a better understanding of their history and how they defined food heritage. My group mates and I had all different academic knowledge going from Applied Biology to Dietetics, which enriched our experience as a whole, by completing our knowledge gaps and allowed us to have a better flow in communication and have a successful group work.

Now What:

This project helped me realize the value of our project in conserving a whole orchard apple tree heritage. For some Food Literacy can seem as a simple concept, but in our project Food Literacy meant conserving a whole culture and legacy that the island's ancestors left. By using our flexible learning days to communicate with our community partner and travel to the island, I learned how to apply theory to the real world and most important of all to understand why are we working on the project. I now feel more comfortable working in this field and using my critical thinking learned in LFS 350 in the outside world.

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APPENDIX

Photo Gallery:



Picture 1. Gambier Island Welcome Sign



Picture 2. Gambier Island Community Centre



Picture 3. View of Gambier Island from the boat



Picture 4. View looking off of Gambier Island



Picture 5. Meghan Enjoying the Community Farm



Picture 6. The Community Peacock



Picture 7. Gambier Islands Heritage Apple Orchard



Picture 8. It Was a Team Effort



Picture 9., 10. and 11. The Team Collecting and Labelling the Scions



Picture 12. Close Up of the Graft Union

Apple Orchard Care Package Created for the GI Community Partners Below:

APPLE ORCHARD CARE – GAMBIER ISLAND

Grafting Technique:

Here is a link to a video on the grafting process, which was performed in order to rejuvenate the trees in the heritage apple orchard on Gambier Island:

https://www.youtube.com/watch?v=y9_a7TRm-C4

The M9 is probably the most widely planted rootstock and it is what we have used to graft the heritage apple trees on Gambier Island. Using this rootstock will allow the trees to bear fruit in 3 to 4 years, yielding 1 to 2 bushels per year.

Most apple tree varieties do not pollinate themselves or any flowers of the same apple variety. Since more than one of the same apple variety from Gambier Island was grafted, it is critically important to be aware of this and to plant at least two different apple tree varieties close to one another so that the bees can pollinate them. (There are actually some self-pollinating apple tree



Pre-Planting:

Spring planting is recommended in central and northern areas. The span of the roots determines the spacing necessary between the trees; M9 rootstocks can be planted **4 to 8 feet apart** and in a row, if desired.

Apple trees are notoriously prone to uprooting under the weight of a heavy crop, so you should provide a support system for your hedge. You can grow your trees against a fence, or you can provide free-standing support in the form of a trellis. Make sure the tree will not be planted in a “frost pocket” where cold air settles in low-lying areas.

Choose a higher site with a slip if possible so that cold air will flow away from the trees. Do not plant trees near wooded areas or trees because they are not good competitors of light and need a lot of airflow. Apple trees grow best in areas with **ample sunlight and well-drained soils** (if the roots get waterlogged the tree may not survive).

Test your soil's pH. Apples grow best in slightly acidic soil. Add lime to decrease the acidity of soil. Work the lime in to a depth of about 4 feet. If your soil is too alkaline, add sulfur to make the soil more acidic. Work the sulfur into a depth of about 1 or 2 feet.



Planting the Tree in the Ground:



Water plants once a week if it has not rained.

1. Before planting, remove all weeds and the grass in a 4-foot diameter circle.
2. Dig a hole approximately twice the diameter of the root system and 2 feet deep.
3. Place some of the loose soil back into the hole and loosen the soil on the walls of the planting hole so the roots can easily penetrate the soil.
4. Spread the tree roots on the loose soil, making sure they are not twisted or crowded in the hole. Continue to replace soil around the roots. As you begin to cover the roots, firm the soil to be sure it surrounds the roots and to remove air pockets.
5. Fill the remainder of the hole with the loose soil, and press the soil down well. The graft union must be at least 2 inches above the soil line so that roots do not emerge from the scion. The graft union can be recognized by the swelling at the junction.
6. Do not add **fertilizer** directly on roots because they can be “burned.” A slow-release

Pruning a Young Tree:

Minimize pruning a young tree (0-3 years). Pruning slows a young tree’s overall growth and can delay fruiting, so don’t be in a hurry to prune, other than removing misplaced, broken, or dead branches. There are several techniques to direct growth without heavy pruning.

For example:

- Rub off misplaced buds before they grow into misplaced branches.
- Bend a stem down almost horizontally for a few weeks to slow growth and promote branches and fruiting. Tie down with strings to stakes in the ground or to lower branches.

Pruning a Mature Tree:

Once an apple tree has filled in and is bearing fruit, it requires regular, moderate pruning (once a year).

- Prune your mature tree when it is dormant (March). Completely cut away overly vigorous, upright stems (commonly high up in the tree).
- Remove weak twigs (which often hang from the undersides of limbs).
- Shorten stems that become too droopy, especially those low in the tree.
- After about ten years, fruiting spurs (stubby branches that elongate only about a half inch per year) become overcrowded and decrepit.

Training a Young-Mature Tree:

Training the branches of an apple tree by tying them together helps the tree keep its shape and maintain good health. In fact, the practice of training an apple tree may continue over a period of many years. A caregiver should look at an apple tree’s trunk as its center or leading part. A caregiver should strive to create an arrangement of limbs (growing outward from the trunk) that have plenty of room to expand. A mature, trained apple tree has branches that have freedom to grow without crowding one another. Many caregivers train an apple tree so that the branches are shorter at the top of the tree and longer at its bottom. As a consequence, all of the tree’s branches are able to receive sunlight. An apple tree that has been properly trained conveys a sense of balance to an observer. *For details and pictures on proper training techniques visit this website:*

Thin the Fruit Ruthlessly:

- Thin or remove excess fruit. This seems hard but this practice evens out production, prevents a heavy crop from breaking limbs, and ensures a better-tasting, larger fruit crop.
- Soon after fruit-set, remove the smallest fruits or damaged ones, leaving four inches between those that remain.

Pest Control:

Apples are prone to pests. Here are some pointers:

- Keep deer at bay with repellents or fencing; deter mice and rabbits with wire-mesh cylinders around the base of the tree.
- Sprays may be needed for insects, although one of the worst culprits, the apple maggot, can be trapped simply enough by hanging one or two round, softball-size balls, painted red and coated with sticky “Tangle-Trap,” from a branch in June through the summer. Reapply the sticky goo a time or two, as necessary.
- Fend off diseases by raking apple leaves, burying them beneath mulch, or grinding them with a lawn mower at the end of the season.
- Pruning reduces disease by letting in more light and air.

For more information on pest control visit:

<http://www.garden.org/howtos/index.php?q=show&id=2153>

<http://www.gardeningknowhow.com/edible/fruits/apples/pests-affecting-apples.htm>



Harvest and Storage:

Harvest Patiently. After all this pruning and caring, be sure to harvest your apples at their peak of perfection.



- Pluck your apples when their background color is no longer green.
- Different apple varieties mature at different times, so the harvest season can stretch from August to October.
- At this point, the stem should part readily from the branch when the fruit is cupped in the palm of your hand and given a slight twist around, then up.
- If the apple is overripe and soft, use for cooking!
- Apples keep well for about six months at temperatures between 32° and 45° F.

“Baked apples have an excellent effect upon the whole physical system, feeding the brain as well as adding to the flesh, and keeping the blood pure; also preventing constipation and correcting a tendency to acidity, which produces rheumatism and neuralgia.” –A Tip from The 1898 Old Farmer’s Almanac

External Links to Other Information:

Frequently Asked Questions & Gallery of Pest Infections to Aid in Detection:

<https://www.rhs.org.uk/advice/profile?PID=769>

Health Benefits of Apples & Apple Cider/Vinegar:

<http://www.almanac.com/blog/natural-health-home-tips/grab-apple>

