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# The Edible Campus

A Research Project

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# The Edible Campus

## Executive Summary

The Edible Campus research project was suggested by the Dalhousie Student Union Sustainability Office (DSUSO) to identify ways of increasing campus sustainability by providing students access to fresh, local food through urban agriculture. Urban agriculture increases food security, nutrition, and urban biodiversity (van Veenhuizen, 2006). This research was completed to determine what is the desirability and what are the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley campus landscape. This was done through a literature review, GIS mapping, interviews and questionnaires administered to students.



*Campus Orchard. By Yvonne Reeves*

The literature review, GIS mapping and interviews helped us determine what opportunities and constraints the campus landscape provides for the implementation of edible plants. Soil quality was expected to be a limiting factor for the inclusion of edible plants on campus, however, interviews with experts in the field of horticulture and planning determined that soil quality is not a constraint for all edible plants. We discovered that berries, orchard and nut trees can be planted directly into the ground without concern about soil quality affecting the human health of those eating the foods produced by these plants.

Student interest in edible plants was gaged through questionnaires. This revealed that the inclusion of edible plants into the campus landscape would improve students' perception of the university. Questionnaires also provided insight into which edible plant species students would prefer to see, demonstrating that orchard fruit and berries are favored among Dalhousie students. It was also determined that there is a high interest in participating in the maintenance of edible plants on campus; this conflicts, however, with a low level of awareness of current campus gardening initiatives.

With the confirmed desirability from student responses, as well as using the opportunities and constraints identified in interviews and questionnaires, a three-phase plan was developed as a suggestion of how to gradually include edible plants into the campus landscape. The first phase is the easiest to implement, the most engaging for students, and consists of low maintenance, highly desired plants. The second phase includes the planting of orchard and nut trees, which are also highly desired based on questionnaires, but take longer to bear fruit and require more resources to plant initially. The third phase would consist of the addition of raised-bed gardening, providing opportunities to grow a wider variety of edible plants, including herbs and vegetables which do require good soil quality.

## Introduction

In a study done by the Ecology Action Centre, the average distance traveled by one food item purchased in Halifax was determined to be 3,976 km (Macleod and Scott, 2010). While importing food is not inherently wrong, there are concerns about the environmental impacts of industrial agriculture practices, food transportation emissions, and storage. In addition, relying heavily on imported food has potential negative impacts for local (and national) food sovereignty and the local economy (Macleod and Scott, 2010). As we increasingly distance ourselves from where our food is grown, we are also removed from the knowledge of how our food is produced, processed, and transported (and the associated environmental and health impacts) (Lucy, 2000). As awareness about our global food system and its impacts on the natural environment and human health increases, urban agriculture is being embraced as a way to improve food access, security and sovereignty, increase urban biodiversity, and support sustainable urban development (van Veenhuizen, 2006). Homeowners, cities, community organizations and learning institutions across the country are engaging in urban food production as a way of eating healthy, reducing their ecological footprint, and developing community relationships around food. Urban agriculture, which includes farms, gardens and edible landscapes, can be broadly defined as “the growing of plants and the raising of animals for food and other uses within and around cities and towns” (van Veenhuizen, 2006, p.2). More specifically, edible landscaping is the process of incorporating food-producing plants and trees into the existing environment (Thai, 2009).

The Edible Campus research project was suggested by the Dalhousie Student Union Sustainability Office (DSUSO) as a means of improving campus sustainability and student access to fresh, local food. DSUSO works to promote sustainable practices and culture within the DSU and at Dalhousie University (DSUSO, 2012). The Office recently celebrated the opening of a Dalhousie Campus Garden behind the Goldberg computer Science Building, and would like to see the inclusion of more edible plants on campus. Recognizing the benefits of urban agriculture, this project aims to encourage the University to incorporate edible plants on Dalhousie’s Studley

campus landscape in order to improve sustainability, reconnect people with their food, and provide learning and volunteer opportunities for students. This research project will answer the following question:

What is the desirability and what are the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley campus landscape?

Incorporating edible plants on campus is in accordance with Dalhousie's *Natural Environment and Landscaping Policy and Guidelines* (2012), which expresses a desire to both enhance the aesthetic quality of the campus landscape while preserving and improving its ecological integrity. Another stipulation of the University's landscaping plan is that "design quality, character, landscape materials and plant communities contribute significant social, economic, and environmental value to the University and the larger community" (p.3). Edible landscaping is an alternative to ornamental gardening, as it can provide significant aesthetic appeal while requiring far less maintenance and fewer inputs, particularly when incorporating native or adapted plants (Beck, Heimlich and Quigley, 2002).

### Project Goals & Objectives

This project provides DSUSO with research and information about the desirability, as well as the opportunities and constraints of incorporating edible plants into the landscape of Dalhousie's Studley campus. The information gathered could be used to support the argument that an edible campus will help Dalhousie University achieve its goals of promoting sustainability, and attracting students to the university through its sustainable activities, as stated in the *Dalhousie University Sustainability Plan* (2010). The project will demonstrate the ways in which the university can operationalize the following two indicators of sustainability as laid out in this plan: enhanced urban biodiversity, and the provision of sustainable food options. Another goal, as stated in the *Dalhousie University Climate Change Plan* (2010), is to incorporate native trees into the natural environment on campus. Integrating native and adapted edible plants and trees will help Dalhousie University reduce its ecological footprint by increasing vegetation cover on campus. This project will help inform decisions made by DSUSO and Dalhousie University, on the possibility of incorporating edible plants into the Studley campus landscape.

## Background & Literature Review

### A Growing Trend Towards Urban Agriculture

Critics of the global food system argue that society's disengagement (and disempowerment) from the production, processing, and transportation of our food is a result of the extreme commodification of our food and the increasing distance between food producers and consumers (Lucy, 2000). Lucy (2000) argues that individuals are separated not only from their food, "but also from knowledge about how and by whom their food is produced, processed, and transported" (p.19). In response, there is a globally growing trend towards urban agriculture and edible landscaping as a means of empowering local communities and reconnecting consumers with their food (van Veehuizen, 2006).

Cities, organizations, homeowners and post-secondary institutions are all recognizing the benefits of growing their own food. On a social level, edible landscaping provides a means of greening and enhancing urban spaces, improving quality of life and empowering inhabitants by allowing them to reconnect with nature and their food (Shwartz et al. 2012; van Veehuizen, 2006). In addition, urban agriculture has been cited as a means of improving food security, health, and nutrition by increasing access to fresh fruits and vegetables (Nasr & Smit, 1992; van Veehuizen, 2006). By increasing the availability of self-reliant, locally grown food, we can not only increase food security and sovereignty, but also empower and strengthen local communities (Lucy, 2000).

Natural design strategies such as edible landscaping have been shown to have positive biological impacts on the urban environment including improved urban biodiversity, habitat creation, resource conservation, increased productivity, storm water management and nutrient cycling (Dearborn & Kark, 2010; Nasr & Smit, 1992; van Veehuizen, 2006). In particular, the use of native and adapted species in edible landscaping has been shown to reverse the ecological impacts of urbanization on native biodiversity and local habitats (Goddard, Dougill & Benton, 2010). While there is debate about the influence of exotic (usually ornamental) species on urban biodiversity, re-establishing native vegetation has been shown to significantly increase the presence and diversity of insect, butterfly and bird species (Burghardt, et al., 2009).

In the context of sustainability, native and adapted plants are generally hardier and require far less in terms of maintenance and inputs (such as water, fertilizer and pesticides) than non-native species (Harper-Lore, 1996). Low maintenance edible landscaping combines elements of the natural environment with conventional landscaping motifs in order to produce a result that is aesthetically appealing (Beck, Heimlich & Quigley, 2002). In this way, edible landscape can be a sustainable replacement or complement to traditional ornamental gardening, as it can provide significant aesthetic appeal while requiring



far less maintenance and fewer inputs (particularly when incorporating native or adapted plants) (Beck, Heimlich and Quigley, 2002).

In addition to cost and varying maintenance requirements, the main barriers to edible landscaping involve perceived risks to human health through contamination of irrigation water, fertilizer, herbicide and pesticide use, and heavy metal presence in soils (van Veenhuizen, 2006). Halifax does not have water quality issues, and provided that irrigation water is either directly from rain or sourced through the city, water contamination should not pose a risk (Heidary-Monfared, 2011). Furthermore, the Halifax Regional Municipality (HRM) has expressed its commitment to sustainable landscaping, and has banned pesticide use on lawns and gardens through its Pesticide By-Law (P-800) (HRM, 2011). Heavy metal toxicity in the soil is of concern on the Halifax peninsula; however, studies have shown that the roots of plants accumulate heavy metals far more than other tissues (such as leaves, fruits, etc.), meaning the risk posed to consumers of these plants is low (Heidary-Monfared, 2011). For these reasons, it is recommended that any root vegetables be peeled and washed before consumption, and that people wash their hands after coming into contact with the soil (particularly because direct ingestion of contaminated soil poses the greatest source of risk). To mitigate risks in soil with high heavy metal concentrations, plants may be planted in raised beds or gardens (Heidary-Monfared, 2011). Additionally, new soil or organic matter (such as mulch, straw or compost) can reduce the prevalence of heavy metals in the soil and prevent contact with plant tissues (Heidary-Monfared, 2011).

## Case Studies

Increasingly, universities and colleges across Canada, including Dalhousie University, are recognizing the social and ecological benefits of incorporating edible plants on campus landscapes. One example is McGill University in Montreal, which implemented an award-winning edible garden in 2007. Their 120<sup>2</sup> metre space is comprised of 275 self-watering containers and two permanent gardens. It was a combined effort of the university, student volunteers, and two local NGOs, and is currently being expanded (McGill, 2012). Reaching out and applying for grants or funding from local organizations represents a way of mitigating the costs of implementing additional infrastructure if it is required to grow edible plants. Producing one ton of produce in 2010, the McGill University garden demonstrates how productive urban agriculture can be incorporated into--and enhance--unused or neglected spaces (McGill, 2012).

The University of Victoria has a long history of campus gardens, one of which is a campus community garden run by a student group (University of Victoria Campus Community Garden, 2009). This garden offers 90 plots for rental by students, staff, and community groups, and has proven itself to be a community-building and educational tool (University of Victoria Campus Community Garden,

2009). The University has recognized the advantages of community gardens (in terms of increasing food security, providing education opportunities, and helping to fulfill its commitments to sustainability and innovation) and has also addressed a number of barriers facing urban gardening on campus (Thom, 2006). One of the concerns expressed by the Facilities Management was that the project would be based on student volunteers (who would graduate and then abandon the project). However, the continued success of the garden testifies to the enthusiasm and student interest in the project, with space actually becoming the limiting factor in student involvement (University of Victoria Campus Community Garden, 2009). Another concern expressed was over land competition (between preserving the natural and expanding the built environments of the campus) (Thom, 2006). However, the University of Victoria decided to commit (in accordance with its sustainability goals) and along with the student group identified a plot of land which would be appropriate. The student group is currently negotiating with the University over the inclusion of more designated gardening plots in the Campus Master Plan (University of Victoria Campus Community Garden, 2012).

The University of Minnesota Duluth is an example of a university that has fully embraced the concept of “edible landscaping” in order to educate students, conserve water, and diversify and enhance the look of its campus (UMD, 2013). The university boasts over twelve diverse gardens in addition to various berry bushes scattered throughout the campus. These “edible gardens” include a raised salad and herb garden, a “bicycle garden” (using recycled household items and containers as pots), and beds for “international” produce, vegetables, edible flowers, and herbal teas (UMD, 2013). Gardens are chaired and cared for by different faculties and campus groups (including one run by Food Services), and materials, plants and support are provided by Facilities Management and an Edible Gardens Coordinator. Most of the produce is grown for educational purposes and campus events, including nutrition and gardening skills workshops (UMD, 2013).

Another organization that is making great progress in small-scale, local gardening is the London Orchard Project. This organization develops small orchards around the city of London, England, utilizing unused urban space, increasing biodiversity, and reconnecting people with their food (The London Orchard Project, 2012). Orchard trees like plums, pears, cherries and apples can be trained or grown on dwarf rootstocks to fit into compact spaces, making them appropriate for the campus landscape. Once established, they require little maintenance compared with annual garden vegetables (The London Orchard Project, 2012). To date the London Orchard Project (2012) has planted 37 community orchards and have partnered with local authorities and groups to cultivate and share community agricultural skills, with great success.

Closer to home, the HRM is engaging with the urban agriculture movement. In 2010, city council released a report expressing its commitment to support local farming. While the report deemed urban agriculture a small component of the local food issue, it also recognized its ability to reconnect people with their food and

increase local food security and sovereignty (HRM, 2010). In addition to numerous community garden plots cropping up across the city, 2012 saw the opening of the Common Roots Urban Farm at the corner of Bell Road and Robie Street. It was started with the goal of connecting residents with nature, empowering the local community to grow their own food, and to restoring underutilized landscapes to promote health and well-being (Partners for Care, 2013). In addition to individual plots, the community farm welcomes volunteers and works with Citadel High School to educate students about urban agriculture.

Dalhousie University, through DSUSO, has also expressed interest in edible landscaping, and has made progress through their support of two community gardens on campus, one of which contains fruit tree installations. Past projects have focused on providing recommendations for diversifying the McCain courtyard (Bright et al., 2008) and implementing an edible garden plot on the Henry Hick's courtyard (Adam et al., 2011). This research project aims to build on previous research and case studies from other Universities and organizations to determine the opportunities, benefits and constraints of incorporating edible plants on the Studley campus landscape.

## Methods

The information required to answer the research question included:

- Do students want to see edible plants added to the landscape?
- What types of native and/or adapted plants (if any) are desired by students?
- What locations are most suitable for edible plants?
- What species are most appropriate for the Dalhousie campus landscape?
- Who will maintain the plants? How?

We began by researching background information for the study, including the benefits and impacts of local agriculture and edible landscaping. The literature review provided the needed context and background information to contextualize and justify the research project. It helped us frame the successes, limitations and focuses of previous research in the area, and what was needed in terms of further research (Palys and Atchison, 2008).

In addition to a literature review, research methods included Geographic Information Systems (GIS) mapping, interviews with planners and horticulturalists, and student questionnaires. These tools were used to gather information to help determine the desirability of the project, the optimal locations for native and

adapted edible plants on Studley campus, and which plant species are the most feasible to implement and maintain.

## Geographic Information System (GIS)

A Geographic Information System (GIS) “integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information” (Esri, n.d.). It allows for the visualization and interpretation of spatial data, in addition to the ability to layer multiple datasets and find relationships (i.e. suitable sites for certain plant species). GIS was used to inform our other research methods, providing a visual context for the project and enabling interview participants to answer questions based specifically on the Dalhousie campus landscape.

Research began with the creation of maps of the Studley campus using GIS, specifically the ArcMap10 program. These maps displayed solar aspect, slope, tree cover and hydrology using readily available data layers from the Dalhousie GIS centre. The maps were used in conjunction with information gained from interviews with planners and horticulturalists to determine potential sites for the addition of edible plants into existing landscaping. A list of sites suggested by DSUSO was also taken into consideration, (appendix I). New data layers were created to show suitable sites and are presented in the recommendation section of this report.

## Interviews

Interviews were chosen as a research tool in order to gather qualitative data regarding appropriate edible plants and locations for the Dalhousie landscape as well as maintenance and implementation suggestions. They were used to gain specific and in-depth information from experts which informed our research. As interview questions can be clarified and elaborated, and a greater depth of response can be achieved, they were deemed ideal for this type of information gathering (Palys and Atchison, 2008).

We opted to include Geographic Information System (GIS) maps for all of our interviews in order to sharpen participants’ memories, stimulate responses, and provide context for recommendations and suggestions (appendix J). Photo elicitation is an interview technique which involves bringing a photograph or other images (such as maps) into a research interview. According to Harper (2002) “there is a need, described in all qualitative method books, of bridging gaps between the worlds of the researcher and the researched” (p.20). Photo elicitation may overcome these difficulties posed by interviews because “it is anchored in an image that is understood, at least in part, by both parties” (Harper, 2002, p.20). In this way, photo elicitation may add reliability and validity to conventional research interviews in addition to eliciting deeper, more meaningful reflections from

participants (Harper, 2002). In our case, maps were used to inform participant responses and stimulate discussions around potential sites and plant choices.

Although the nature of the information being gathered is not particularly sensitive, it is still important to ensure data from interviews is collected in as unbiased a manner as possible. In order to avoid leading the interviewee into making reactive statements or suggestions, researchers endeavored to remain neutral and deliver questions in a detached and standardized form (Palys and Atchison, 2008). That said, researchers were be open to changing the flow of the discussion based on the interests of the interviewee, thus increasing the possible breadth and depth of information acquired. To avoid unintentionally influencing the opinions of interviewees, interviews were conducted by different researchers to ensure that one individual's bias was not present in all data collection (Jupp, 2006).

After identifying the information needed for the study, research was done to create a list of experts in the area of horticulture and planning, as well as staff involved in landscaping on campus, who would be contacted for interviews (see appendix A). Interview questions were piloted to ensure they were appropriate and would provide information relevant to the study. Researchers contacted participants by email or phone to set up a time to meet. Introductory scripts and interview questions can be found in appendices B and C. Each interview took from thirty minutes to one hour, depending on the conversations and interviewer. Interviewers took notes and/or recorded the interview for further analysis.

For all of the interviews we used GIS maps as visual aids to clarify potential locations where edible landscaping could be implemented (see appendix J). Providing maps not only refreshed participants' memories of the campus landscape, but also provided additional context such as slope, hydrology, tree cover, solar radiation. This allowed interview participants to make informed recommendations and suggestions, increasing the quality of our responses.

Horticulturalists were asked specific questions about planting an edible landscape on Studley campus. These interviews gave us insight into which native plants are the most practical to plant and require the least amount of maintenance. We aimed to learn which growing conditions are required for the suggested species and if any structures such as raised beds or fences would be required. The information gathered helped inform which vegetation and orchard trees would be best to include in our recommendations and allowed us to define possible locations for edible landscaping.

Transcripts of interviews were compiled and their analysis consisted of determining which edible plants are appropriate for the recommended sites. A list of suitable plants was created to inform the options provided in the student questionnaire (see appendix G). The interviews also provided information about the opportunities and constraints of incorporating edible plants into the landscape of Studley campus more generally.

## Student Questionnaires

After the information on suitable locations and potential plant choices was determined through interviews and our literature review, questionnaires were used to determine student interest in the project as well as which specific plants students would like to see on campus. Questionnaires were chosen as a research method because the information needed could be obtained through straightforward questions and it provided the opportunity to obtain an acceptable sample with limited time and budget (Palys and Atchison, 2008). They were easy to administer and reached a fairly large population, despite the short amount of time spent administering them. The target group for questionnaires was any students of Dalhousie University, as the addition of edible landscaping will not impact any one faculty or group more than another.

Questionnaires were piloted in order to determine the appropriateness of the questions and the information received, eliminate any confusing word choices, and provide an estimated time required to complete them. The group had a maximum of 6 hours to administer the questionnaires in two-hour segments between March 14<sup>th</sup> and 16<sup>th</sup>. With two researchers administering the questionnaire at a time, a sample size of 144 students was completed.

The questionnaires were administered face-to-face by researchers to the students, as Palys and Atchison (2008) say that this method provides higher response rates and the opportunity to clarify question with respondents. This proved to be true. The questionnaire contained a combination of one open-ended and eight structured questions designed to determine whether students wanted to see edible plants included in the landscaping on Studley campus, and if so, what varieties (appendix G). The structured questions allowed researchers to cover a lot of ground in a short period of time, while the open-ended question provides insight into a respondent's opinions concerning their perception of Dalhousie University (Palys and Atchison, 2008). Researchers used a script (see appendix F) and cookies as food incentives to recruit respondents.

Researchers conducting the student surveys located themselves at high-traffic areas on campus: the atrium of the Killam Memorial Library, near the entrance of the Student Union Building (SUB), and in the lobby of the Goldberg Computer Science Building. This allowed researchers to catch students at a time when they were not rushing to class. The questionnaires took about 5 minutes each; 3 minutes to complete and 2 minutes to recruit and for any clarifications and/or questions that came up. Convenience sampling was used as we did not have a sampling frame for the Dalhousie student population (Palys and Atchison, 2008). To ensure that researchers were not selective about the individuals they approach, we tried to use a method of selecting every 5th person who passes by (T. Wright, personal communication, February 5, 2013).

Upon completion of the questionnaires, frequency tables of responses were assembled and pie charts were created to display and analyze results. Central tendencies were also calculated and displayed in graphical form. This data provided a gauge for student interest for the incorporation of edible plants on campus and rationalization for what species students would prefer to see planted.

### Limitations and delimitations

There were a number of limitations and delimitations in our research project. Due to the timeframe of the project, it was necessary to narrow the scope; consequently the project looked specifically at edible landscaping on Studley campus. This delimitation was chosen because Studley campus has the most potential for edible landscaping and a high density of students. Previous projects have been conducted on the campus, thus providing information to inform the research. Additionally, our group was the most familiar with the Studley campus landscape, making it easier to navigate.

Other delimitations for the project included the sample size for questionnaires, and our decision not to collect new soil samples. A manageable and realistic sample size was chosen for the data collection from student questionnaires, based on the time and human resources available. Soil sample collection was not a priority for the project as recent soil data exists.

In addition to the delimitations, there were limitations beyond the control of this study, including the challenge of getting a statistically significant sample from such a large population and the availability of group members. The reliability of our project was also compromised to some degree by students' interest and willingness to fill out our questionnaires. As much as we tried to regulate our sampling by polling every fifth person that walked by, frequently the fifth person did not want to answer our questionnaire. The questionnaires were also limited as we did not want to make them too long. Thus, we were not able to ask all the questions we might have had length not been a concern. Finally, group availability was a limitation; all group members were enrolled in full-time study and had a number of time constraints to navigate, posing some challenges.

### Discussion of reliability, validity, and/or trustworthiness

Throughout the research process we sought to ensure the validity, reliability and trustworthiness of our methods and results. To improve reliability, our research tools were selected after consulting research guides (such as Palys and Atchison, 2008) and we focused on accurate and dependable data collection and analysis to ensure the trustworthiness of our results. We worked to increase the reliability and validity of our research methods by piloting our questionnaire and interview questions, as well as our GIS techniques. For our interviews, we followed the recommendations put forward by Palys and Atchison (2008) in order to ensure consistency and reliability in our results. In terms of our questionnaires, the random

and public selection of participants helped to ensure as accurate a representation as possible. That being said, a fairly small portion of the student population was polled, which may pose problems for the reliability of the collected results. The sample size was deemed the most feasible for the scope of the project, but the results may not accurately depict the thoughts and opinions of the whole Dalhousie student population.

The questionnaire process encouraged participants to consider the opportunities and benefits of edible plants on campus and reflect on their interest in participating in planting and maintaining these plants. We also sought to introduce catalytic validity into our research by including information about the campus gardens at the bottom of our questionnaires and by educating curious participants about their location and how they could get involved.

## Results

### Interviews

Interviews were conducted with four individuals identified as experts in the fields of horticulture and environmental planning. We spoke with Jackie Bezanson from Blomidon Nurseries in the Annapolis Valley, Stephen Cushing, a horticulturalist and current Masters candidate at the School for Resource and Environmental Studies, Patricia Manuel from the School of Planning, and Jayme Melrose from Common Roots Urban Farm. A copy of the questions asked can be found in Appendix C.

The interviewees all agreed that perennial plants would be the easiest to maintain, as they do not require replanting every spring. Perennials require a slightly higher start-up cost, but are highly economical in the long run (as opposed to annuals). Perennials are also favorable due to the abundance of native species; there are very few native annual species in Nova Scotia.

They also agreed that there are a number of species which do not require the soil to be free of contaminants; plants like berry bushes hold toxins in their roots so as to protect their fruit from contamination. Berry bushes are ideal for the edible campus as they are highly recognizable and very popular. It was also noted that drought-tolerant species (like high-bush blueberries) would also aid against contamination and would be a highly favorable addition to the landscape. Raspberry and blackberry bushes were recommended for poorly drained areas. Strawberries, fiddleheads, cucumbers, and rhubarb were all recommended for groundcover.



The interviewees were all very enthusiastic about the incorporation of edible tree species on campus. Apple, plum, Indian pear, cherry, sugar maple, hazelnut and chestnut trees were all considered viable options for Studley campus. These tree species do not do well in areas with standing water (poor drainage) and need a substantial amount of light. They would be best planted in areas that receive high levels of solar radiation. It was recommended that these trees be planted at a slight setback from pathways so as to ensure fallen fruit and/or nuts do not litter high traffic areas.

Root vegetables and herbs pose some potential obstacles, according to our interviewees. These plants require better soil quality and are more susceptible to contamination, so it was recommended that these be incorporated into the landscape using raised beds (either free form or wood-framed beds). The interviewees suggested these be implemented in a later stage of the project, as they require more inputs and slightly more maintenance. It was also noted that leafy vegetables (such as rhubarb) could pose problems due to a lack of familiarity for most people; rhubarb leaves are toxic when consumed by humans. This could be mediated through the use of signage to protect and educate students about edible plants.

The interviewees felt overall that berry bushes be the first edible plants to be incorporated into the current landscape design, then fruit and nut trees, and later herbs and root vegetables. These results were used to inform our student questionnaire to further our research for the edible campus.

## Student Questionnaires

### Desirability of Edible Plants on Campus:

144 students completed student questionnaires (see appendices F and G). There were respondents from each of Dalhousie's 11 faculties, over half in the faculty of Science and Arts and Social Sciences, with 31 percent from the former and 27 percent in the latter. Responses to questions regarding interest in eating campus grown food were overall positive, with 44 percent of participants stating that they were "Very Interested", 25 percent in both the "Interested" and "Somewhat Interested" categories and 6 percent stating that they were "Not Interested".

Positive responses were also received for the following question about how their perception of Dalhousie University would change with the implementation of edible plants on the Studley campus. 79 percent of participants stated that the inclusion of edible plants on campus would improve their perception of the school. Students were also able to include a written response to this question. 35 students stated that the improved perception was due to greater access to food or for health reasons, 27 mentioned sustainability, and 38 thought the campus would be more

interesting or beautiful. 15 percent were unsure if it would improve their perception, and 6 percent stated that it would not be improved. The primary reason for a negative response to the question, which was mentioned 3 times, was a higher concern for other campus issues. The primary responses from the “Not Sure” category were differing priorities, mentioned twice, and the lack of knowledge about the edible campus project or food issues in general, mentioned 6 times.

#### Popularity of Specific Edible Plants:

Students were asked to rank a list of potential edible plants based on which they preferred to see included on campus. One question asked about food categories (berries, orchard fruit, herbs, nuts and vegetables) and another about individual plants. Figure 1 represents the data obtained from the question asking students to rank their preferences based on categories of edible plants. The highest scores belong to the orchard fruit and berries categories, with mid-range scores for nuts and vegetables, and herbs receiving the lowest ranking.

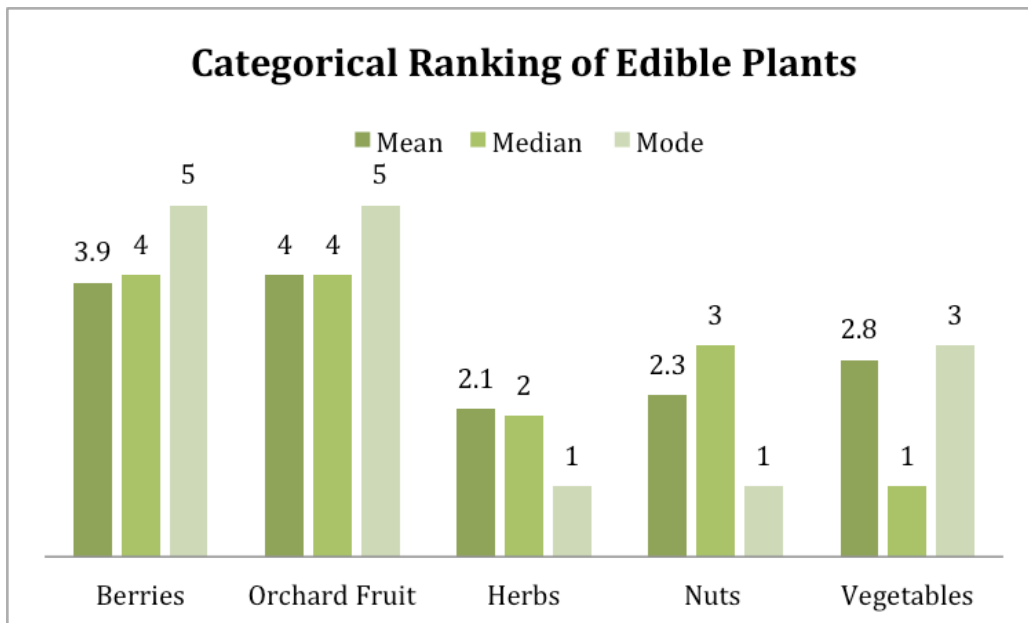


Figure 1.

The second ranking question asked students to pick their top 10 edible plant choices out of 36 options provided. The options were developed based on information obtained from interviews about plants that would be suitable for the campus because they are native or adaptive and require little maintenance. Rankings were tallied to see which plants received the highest scores overall. Results from both questions demonstrate that the strongest interest is in orchard fruit and berries with 8 of the top 10 choices belonging to those two categories (see Figure 2).

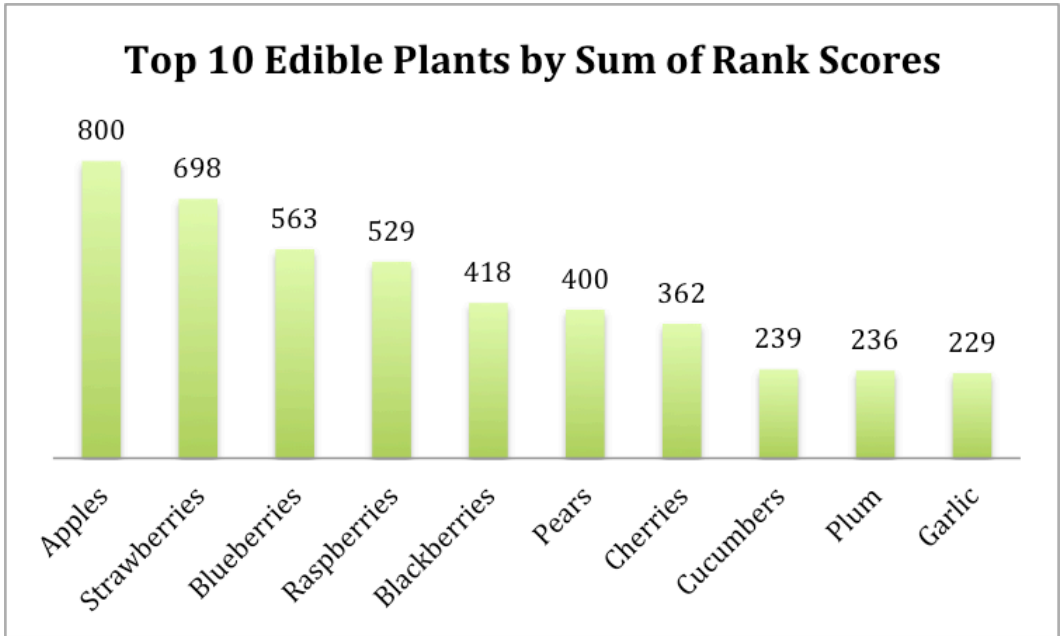


Figure 2

#### Student Awareness and Interest in Plant Maintenance

66 percent of students have participated in growing vegetables, fruits or herbs before and 45 percent of students sampled stated that they would be interested in helping to maintain edible plants on campus. However, only 27 percent of respondents stated that they were aware of current community gardening initiatives on campus. This signifies that there may be more participation in on-campus gardening if people were more aware of the opportunities to get involved.

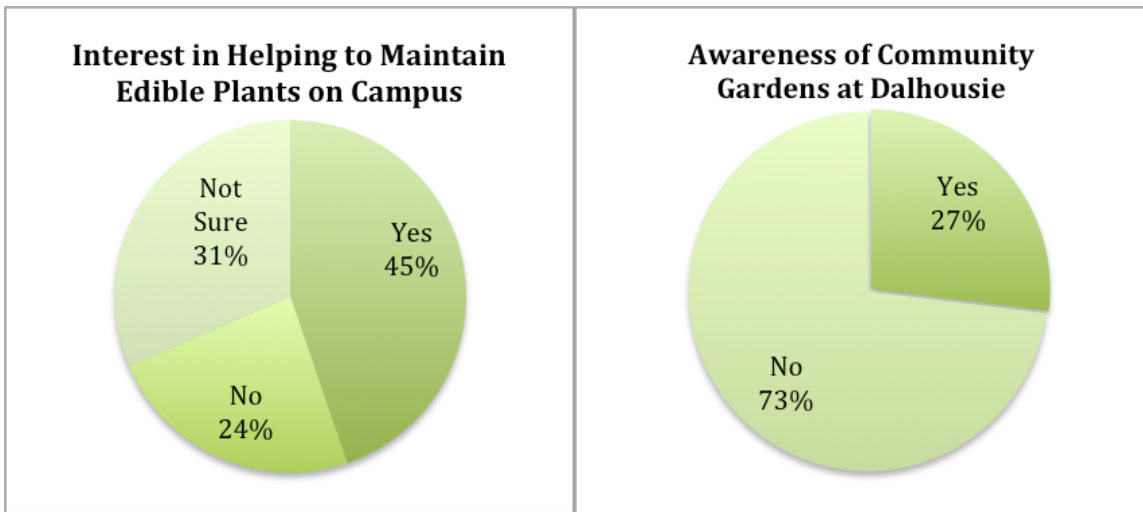


Figure 3

Figure 4

Figures 3 and 4 above compare the low frequency of awareness of campus gardens to the higher level of interest in helping to grow edible plants.

A question also asked students to identify which semesters they will be in Halifax in the next academic year (fall, winter and summer 2013-2014). This was asked mainly to determine when students would be present to harvest or help maintain the edible plants during growing seasons. Of the 144 students polled, 73 percent will reside in Halifax in the fall and 46.5 percent in the summer. Although the sample size is not considered to be statistically significant, it is important to note that most students sampled, 81 percent, will be returning for at least one semester in the coming academic year. For this reason researchers are considering the data from students regarding preferred edible plants and interest in helping with maintenance to be significant.

## Discussion

### Purpose of the research

The aim of this research project was to investigate the desirability, as well as the opportunities and constraints, of incorporating edible landscaping onto Dalhousie's Studley campus. Questionnaires and interviews allowed the researchers to engage with students and experts on the topic, and gather information from varied sources. The literature review also provided the research team with a solid foundation regarding the importance of urban agriculture, as well as case studies to help guide the research process and provide examples of successful campus gardens across North America. The findings presented will provide DSUSO with the information to make informed decisions and recommendations in regards to incorporating edible plants on Studley campus.

### Overview of significant findings

Our research produced many significant findings. The first and perhaps most significant finding was the inconsequential nature of soil quality. Initially it was believed that direct plantings should be avoided (as this is what was suggested by previous research projects from this class including the *Dalhousie Edible Garden Plan: Design Concepts for the Henry Street Plot* (Adam et al., 2011) and *Diversifying the Vegetation in the McCain Courtyard*, (Bright et al., 2008)). It became evident through our research and interviews with horticultural and planning specialists that this is not actually the case. Many plant species are highly tolerant of poor soil quality and produce edible fruits, nuts, and vegetables that are safe for human consumption. Berry bushes in particular were cited as ideal plants presenting many opportunities for Studley campus, as they hold contaminants in their root systems and produce edible, healthy fruit regardless of soil quality. Fruit and nut trees were

also mentioned as favorable additions to the campus landscape, especially in areas with high solar radiation and moderate drainage. The solar radiation map shows a high number of opportunities for orchard and other edible tree species on campus, though these plants do require more maintenance and attention than berry bushes, which can be perceived as a possible limiting constraint. Root vegetables and delicate herb plants, like mint, cilantro, and chives, are more reliant on better soil quality to produce healthy plants that are safe for consumption, providing a constraint for their implementation; however, the infrastructure needed to support them is minimal. These plants require raised beds, either free form (soil mounds) or wood-framed.

Other significant findings were discovered through direct contact with students. Student interest was gaged through questionnaires, with 79 percent stating that the inclusion of edible plants would improve their perception of the university. It is clear from the research that students are interested in the project, with 94 percent stating they would be interested in consuming fruits, vegetables and nuts grown on campus. This was an interesting finding, as awareness of current campus gardening initiatives is very low, with only a quarter of students polled having knowledge of current campus gardens. Questionnaires also provided insight into which edible plant species students would prefer to see, demonstrating that orchard fruit and berries are favored among Dalhousie students.

Information was triangulated by obtaining similar results from both the interviews and questionnaires. This allowed us to develop logical recommendations based on landscape opportunities and student preferences. Both interviews and questionnaires resulted in berry bushes and orchard fruits being favored for fondness and site appropriateness. Grounded on these findings we have concluded that there is an opportunity to introduce edible plants on campus through edible landscaping.

## Conclusion

### Major contribution of the study

The research conducted for this project revealed a number of interesting findings that point to an opportunity for Dalhousie University to incorporate edible landscaping on Studley campus. The project indicated that there is high student interest in having edible plants available for foraging on campus and also informs which species the students would like to see planted. Native and adapted plant species have been identified, which were not only popular with students but also recommended by horticulturalists and planners as species that would require little maintenance and few additional resources to plant. Through the information gathered from horticulturalists and planners, this research provides an overview of the key considerations that should be made when planting edible species on

campus. Examples were found of other universities in North America that have successfully intruded edible plants into their landscapes such as McGill University and the University of Victoria. By looking at these case studies we see how other institutions started and have maintained edible species within a campus setting.

### Recommendations for action

Based on our findings from this project, and a suggestion from DSUSO, we propose that Dalhousie's Facilities Management consider incorporating edible plants into the landscape in three phases. The suggestions for the plant varieties of each phase were selected using the information we gathered during our interviews as well as plant popularity from student surveys. By using a phase approach, Facilities Management can use the first phase as a trial without investing many resources at the beginning. If the first phase is successful, and the Dalhousie community appreciates the edible plants, Facilities Management can then move on to a second phase of planting. The third phase of planting is designed to take place if support for edible landscaping on campus continues to be prevalent after the first two phases. By using a three-phase approach, Facilities Management will be able to gradually introduce more edible plants without the risk of investing many resources from the start. The project can then grow with the interest from the Dalhousie community.

The first phase includes planting berry bushes into the existing beds on campus. There are many available beds, which receive ample sunlight for growing fruit, that are currently planted with ornamental plants. Very little new soil will be needed to plant berry bushes into these existing beds. As we learned with our interviews, berry bushes can be planted directly into the ground without the risk of any contaminants or heavy metals from the soil posing a hazard to peoples' health. It was also found through interviews that it is important to start with recognizable, edible plants. Berries are easy to identify as plants that can be eaten and to distinguish which parts of the plant can be eaten. That said, it would be beneficial at all stages to include signage to help identify, educate and increase awareness for potential consumers.

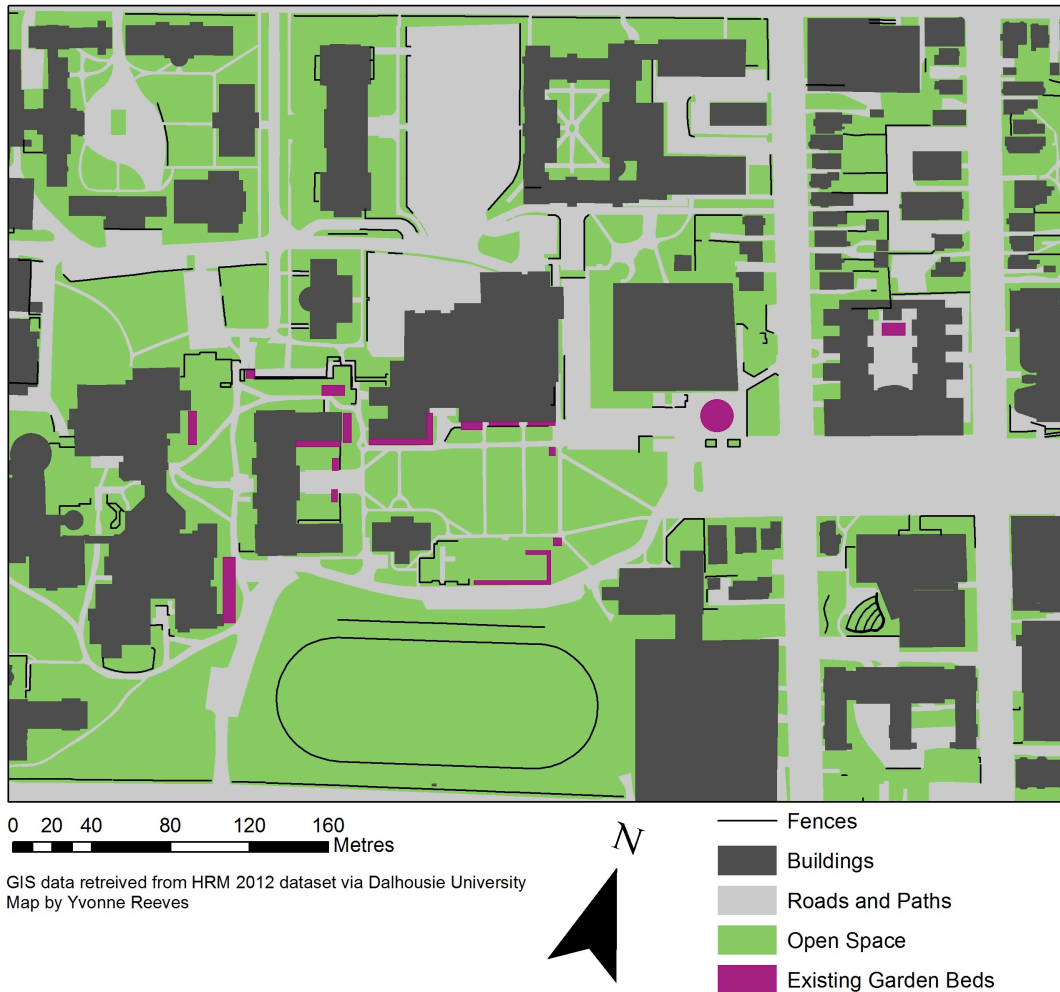
Raspberry and blackberry bushes that have thorns should be kept away from walkways where people's clothing could be snagged. In addition, trellising and root barriers may be required for growing blackberry and raspberry bushes to control growth, as they can be invasive. Strawberries and blueberries can be planted directly into the beds with no further input; both of these plants are great for groundcover. If there is concern about soil coming into contact with berry fruit, placing a layer of mulch, straw or organic compost would reduce any potential risk of contamination (Heidary-Monfared, 2011).

According to our survey results, strawberries, blueberries, raspberries and blackberries were among the top five choices by students for plants they would like

to see on campus. Starting with popular plant choices will ensure that the project will be appreciated by a wider group of people from the beginning. The information gathered by both our interviews and surveys suggest that this first phase will be the easiest to implement, require few resources, and involve the most popular plants amongst students. The Phase One map shows where existing beds that can be used for planting berry bushes are located. These beds receive enough solar radiation for growing berries and already have soil for planting.

## Phase One

### Potential Areas for Berry Plants



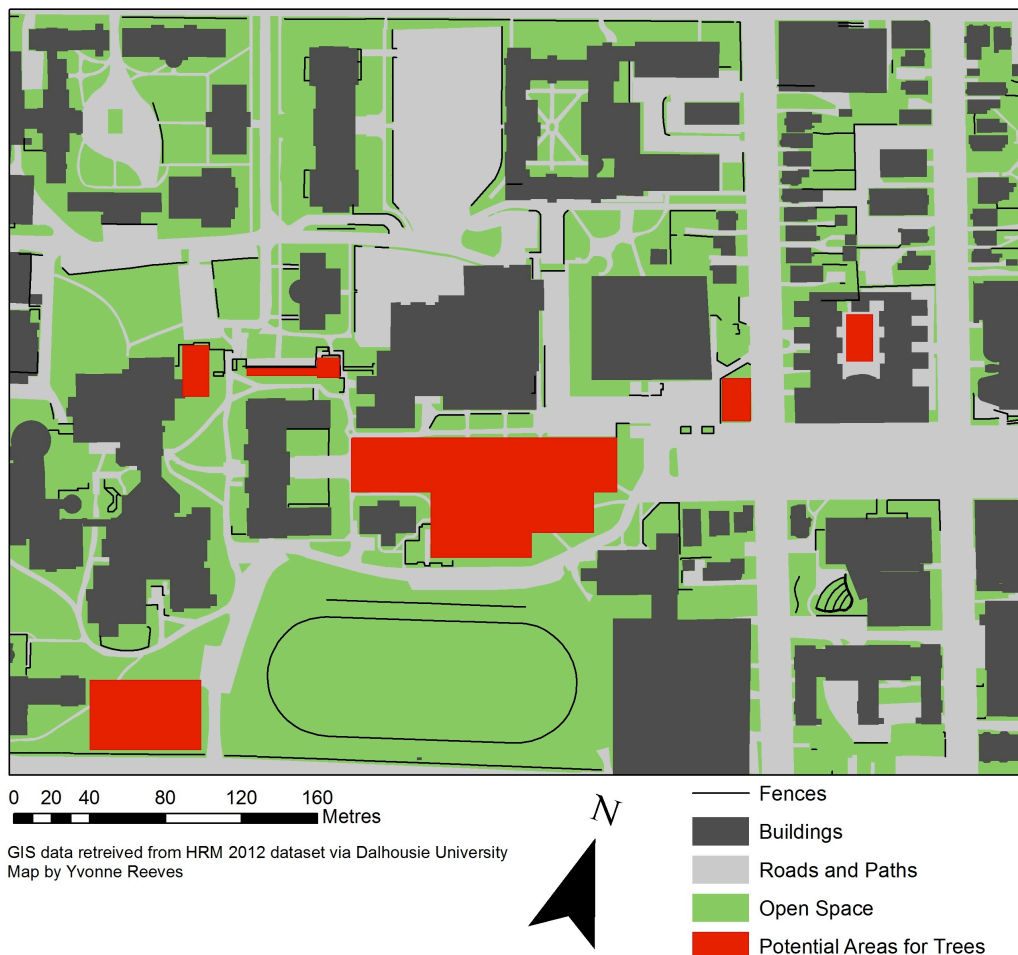
Phase two involves planting nut and orchard trees, such as apples, pears, cherries, plums, hazelnuts and chestnuts within the Studley campus landscape. The Studley campus has a number of open spaces that would be suitable for growing these trees. From our interviews we learned that nut and orchard trees can also be planted directly into the ground without a risk to human health from soil

contaminants. They will require additional soil to be brought in for planting and some existing turf will need to be dug up to make room for the new trees. Planting orchard trees will require more effort and resources than the berries from phase one to start, yet, they require very little additional effort and maintenance once planted. Trees should be placed in sunny areas, where fruit from the trees are less likely to get spotty from worms, and away from paths to minimize mess on the pathways from fallen fruit. Orchard trees will take time before bearing fruit but can be enjoyed in the meantime as they have beautiful blooms in the spring.

Orchard fruits were also very popular according to our student questionnaire. Phase two involves planting apple trees, the most popular plant choice from the questionnaire and other orchard trees including pears, cherries and plums, these fell within the top ten popular plant choices by students. The plants we recommend for phase two would, therefore, be popular amongst the student population of Dalhousie and easily recognizable as being edible plant species. The Phase Two map shows possible areas where orchard trees can be planted.

## Phase Two

### Potential Orchard and NutTree Areas

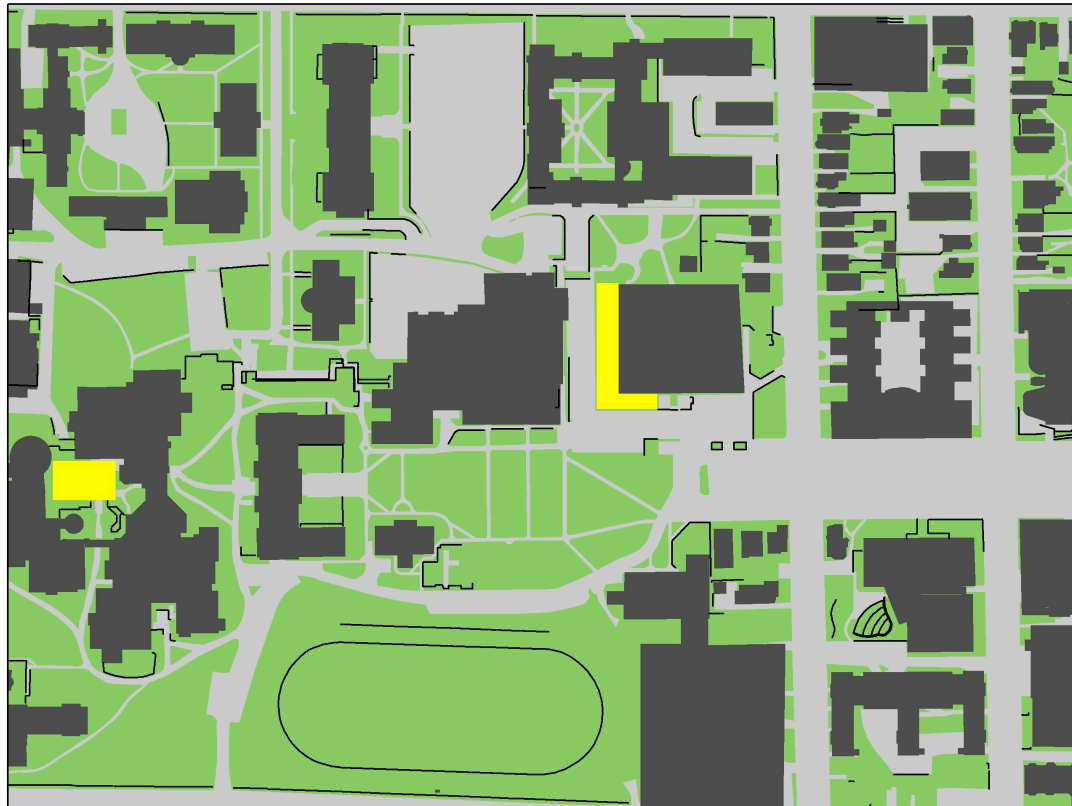




Phase three involves the construction of planters for herbs and vegetables over the gravel surrounding the Killam Library and in the central courtyard of the Life Sciences Building. These are large, open areas where plants have the potential to improve the aesthetics of each space. Phase three would require the construction, or purchase of planters, as well as to have soil brought in to fill them. Our interviews informed us that these plant types are best grown in planters, especially herbs, as they can become invasive otherwise and require better soil quality. Our interviews also informed us that signs should be used to label herb and vegetable plants, as they may not be easily recognizable as edible plants. Signs would inform which plants are present in the beds and which part of the plant can be eaten. This phase would require the most resources and effort to implement from Facilities Management as well as ongoing maintenance of the beds. Depending on awareness and interest, this phase could also involve student volunteers similar to the development of the McGill and University of Victoria campus gardens (McGill, 2012; UVic, 2009). An analysis of the success and popularity of the first two phases will inform Facilities Management of whether the resources needed for the third phase are worth investing into the project. The Phase Three map shows the area around the Killam Library where raised planters could be located if this phase is implemented.

## Phase Three

### Potential Areas for Raised Beds



0 20 40 80 120 160  
Metres

GIS data retrieved from HRM 2012 dataset via Dalhousie University  
Map by Yvonne Reeves



- Fences
- Buildings
- Roads and Paths
- Open Space
- Potential Areas for Raised Beds

In addition to considering our three-phase approach for incorporating edible plants into the Studley landscape, we also propose that edible plants be added to the approved species list of the *Dalhousie University Design Guidelines*. This project shows that there is ample student support for edible landscaping on campus, as well as that many adapted fruit species meet the criteria for currently approved species. According to the design guidelines, species must be native or adapted, provide habitat for birds and animals, and require little maintenance (Dalhousie University, 2009). Edible plants should also be included in Dalhousie's upcoming *Natural Environment Plan*. Including edible species in the campus design plans will help improve the visibility and abundance of edible plants on Studley campus.

## Recommendations for further research

This project indicated that students' interest is high for having edible plants on campus and that students prefer fruit bearing plants. For future research on this subject we recommend that studies be carried out between each phase of implementation in order to monitor the success of each phase before moving forward with the next. Research into the mindsets of the students and the maintenance staff after each phase would inform Facility Management's decision about moving forward to each new phase. The second and third phases could be modified through further research to accommodate the requests from future students and staff members.

This project also showed that nearly half the student population is interested in getting involved with growing food at the university but only a quarter of students know about the current campus garden. This indicates a lack of awareness about campus gardening initiatives despite significant student interest. It is recommended that efforts be made to increase student awareness of edible plants (through signage, posters, volunteer opportunities, etc.). Research into how students' awareness can be increased and how to involve students in campus grown food will be beneficial in encouraging the student population of Dalhousie to take part in urban agriculture. A research project could be undertaken to see if there is student interest in a gardening course through the university; the course would inform students in how to care for and harvest plants while minimizing maintenance staff's efforts in caring for edible plants on campus. This might encourage departments, faculties or student groups to maintain specific gardens on campus, similar to the edible campus program at the University of Minnesota Duluth (UMD, 2013).

Further recommended research also includes examining the costs of implementing edible plants into the landscape, as well as finding possible funding sources. Funding sources may be available through grants given by organizations such as Evergreen, TD Friends of the Environment Foundation, and Aviva Community Fund. Research into the opportunities and constraints of incorporating edible plants into the landscape of the broader community of the Halifax Regional Municipality would benefit the city at a larger scale. Dalhousie University can lead the way for the rest of the city and encourage edible landscaping throughout the city.

## Acknowledgements

The research team would like to thank our course mentor, Laurie Lidstone for her guidance throughout the project. Her wisdom and encouragement helped us through the trials and tribulations of our first major research project and we are incredibly grateful.

We would also like to thank our interviewees, Jackie Bezanson of Blomidon Nurseries, Stephen Cushing from the Dalhousie School for Resources and Environmental Studies, Patricia Manuel from the Dalhousie School of Planning, and Jayme Melrose from Common Roots Urban Farm. Their knowledge and guidance were invaluable to us and we cannot thank them enough for their time and enthusiasm.

The research team would also like to acknowledge DSUSO, specifically Rob MacNeish, for their leadership and passion throughout this project; if it were not for them there would be no edible campus plan.

A final thank you goes to the students who filled out our questionnaire; your interest and enthusiasm helped to reinforce our belief that this project is worthwhile and important.

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## Appendices

### Appendix A: List of Interviewees

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Jackie Bezanson- Retail Manager, Blomidon Nurseries

Stephen Cushing- Masters Candidate, Dalhousie School for Resource and Environmental Studies

Patricia Manuel- Associate Professor, Dalhousie School of Planning

Jayne Melrose- Coordinator, Common Roots Urban Farm

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## Appendix B: Script to Recruit Interview Participants (Phone or E-mail)

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Hello,

My name is \_\_\_\_\_ and I am a student enrolled in Dalhousie's "Campus as a Living Lab" course. I am doing a research project on the incorporation of edible, native or adapted, plants on Dalhousie's Studley Campus. Would you be available for a half-hour interview to help guide us on the practical matters involved with edible landscaping on Dalhousie's campus? The results from our study will be made publicly available upon completion of the project in April 2013.

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## Appendix C: Interview Questions

(Mapping developed earlier in the study will be brought to the interview and shown to the horticulturalist to inform them about the natural assets of the areas being considered for planting edible plants)

*Script to describe the project and goals of the interview:*

For the edible campus project we are aiming to introduce edible, native and adapted plants into the existing landscape on Dalhousie's Studley Campus. We have created maps using GIS to locate possible areas that could be planted with edible species. These maps also show the natural assets of the proposed areas such as sun exposure. I would like to discuss with you which plant species would be appropriate for the proposed areas as well as gain an understanding from you about the maintenance involved in growing these species.

1. From looking at the maps, what are some species that you would recommend to plant in the proposed areas, which are low-maintenance, edible, and native or adapted, based on the natural assets of each area?
2. Are annuals or perennials easier to maintain? Would there be an advantage of planting one over the other?
3. Would it be possible to plant the species you have recommended into the ground directly? Or would raised beds, or another gardening technique, be necessary?
4. Would the plants you have recommended require any additional structures such as fences?
5. What would be involved in the maintenance of the plants you have recommended?
6. Are there any other factors we should consider when choosing edible plants to be incorporated into the existing landscape on Dalhousie's Studley campus?

## Appendix D: Interviewee Thank You Letter

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Dear \_\_\_\_\_,

We are writing to thank you for your participation in our Edible Campus research project. Thank you for sharing your knowledge with us, and taking the time to answer our questions. Your input is greatly valued and appreciated!

If you have any questions about the project, please do not hesitate to contact us (maclearj@dal.ca).

Sincerely,

The Edible Campus Crew

(Monica Belliveau, Melissa LeGeyt, Ryan MacLean, Yvonne Reeves and Erika Woolgar)

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## Appendix E: Script to Introduce Questionnaire

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Hi, my name is \_\_\_\_\_ and I am doing a research project for my sustainability class on introducing edible plants into the landscape of Studley Campus. I am conducting a survey to gain insight into the interest of students in having edible plants on campus as well as what type of plants students would prefer. Would you mind answering a short questionnaire? It will only take a few minutes of your time and is an anonymous survey. The results will be publicly available once the project is complete.

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## Appendix F: Questionnaire

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1. In what department are you currently enrolled? \_\_\_\_\_

2. On a scale of 1 - 4, how would you rate your interest in eating food grown on campus: (Circle one)

1 - Not Interested

2 - Somewhat Interested

3 - Interested

4 - Very Interested

3. Would the presence of edible plants such as fruit trees, nut trees, vegetables and herbs on campus improve your perception of Dalhousie University? (Check one)

Yes

No

Not sure

Please

explain \_\_\_\_\_

—

4. What kinds of edible plants would you be interested in consuming on campus?

Please rank from 1 - 5 in order of preference; 1 being most preferred, 5 being least preferred:

\_\_\_ Berries (blueberries, blackberries, etc.)

\_\_\_ Orchard Fruit (apples, pears, etc.)

\_\_\_ Herbs (chives, garlic, etc.)

\_\_\_ Nuts (hazelnuts, chestnuts, etc.)

\_\_\_ Vegetables (kale, broccoli, beets, etc.)

5. Have you ever participated in growing vegetables, fruits or herbs? (Check one)

- Yes
- No

6. In the next academic year (September 2013 to September 2014), which semesters do you plan on living in Halifax? (Check all that apply)

- Fall
- Winter
- Summer
- None

7. Would you be interested in helping to maintain edible plants on campus?

- Yes
- No
- Not sure

8. Which edible plants would you be most interested in consuming?

Please rank only your **TOP 10** choices from any of the categories in order of preference, with 1 being most preferred:

**Berries**

- \_\_\_ Blackberries
- \_\_\_ Blueberries
- \_\_\_ Cranberries
- \_\_\_ Elderberries
- \_\_\_ Raspberries
- \_\_\_ Strawberries

**Fruit Trees**

- \_\_\_ Apples
- \_\_\_ Cherries
- \_\_\_ Pears
- \_\_\_ Plum

**Herbs**

- Chives
- Cilantro
- Dandelion
- Dill
- Garlic
- Mint
- Parsley
- Summer Savory
- Thyme
- Watercress

**Nuts**

- Chestnuts
- Hazelnuts

**Vegetables**

- Beets
- Broccoli
- Cabbage
- Corn
- Cucumbers
- Fiddleheads
- Kale
- Lettuce
- Mache
- Onions
- Peas
- Rhubarb

**Other**

- Rose Hips
- Sugar Maple

9. Are you aware of the community gardens on Studley Campus? (Check one).

- Yes
- No



Dalhousie has recently established the Dalhousie Undergraduate Garden Society. For information about how you can get involved in gardening on campus contact [dalhousiecommunitygarden@gmail.com](mailto:dalhousiecommunitygarden@gmail.com).

**Thank you for your participation. All responses will be kept anonymous.**

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# Appendix G: Questionnaire Results, Raw Data

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30								
1. Department	2	2	9	8	1	6	8	5	3	6	3	8	3	8	8	9	6	1	2	2	9	2	9	2	9	12&.11	10	11	9	2								
2. Interest	3	4	4	2	4	3	1	2	2	4	3	4	2	3	4	2	4	3	3	3	3	4	4	4	4	4	4	3	4	3	4							
3. Presence	1	1	1	1	1	3	2	3	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
4. Berries	4	2	5	5	5	4	2	3	2	4	2	4	2	4	3	5	5	3	3	3	3	4	1	5	5	5	2	2	5	2	5							
4. Orchard Fruit	5	5	4	2	1	5	4	2	1	5	2	5	3	5	5	4	3	5	4	4	3	3	4	3	3	4	3	4	3	1	4							
4. Herbs	2	4	1	1	2	1	4	4	4	2	1	2	2	2	2	2	2	2	2	1	1	2	5	3	2	3	5	5	1	3	3							
4. Nuts	3	1	3	4	3	3	1	1	3	5	4	1	1	1	1	1	1	1	1	5	2	1	4	1	1	2	1	4	2	1	1							
4. Vegetables	1	3	2	3	4	2	3	5	1	1	3	3	4	3	4	4	4	4	4	2	5	2	5	2	2	4	1	4	3	3	5							
5. Participation	1	1	1	2	1	2	1	2	1	1	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1	1	1	1	1	1	1	1						
6. Halfax	4	5	8	1	8	1	4	8	3	4	8	8	5	4	4	8	5	4	8	5	8	8	4	6	2	4	4	5	1	1	8							
7. Helping	2	3	1	1	1	1	1	2	3	1	1	1	1	1	1	1	2	1	3	1	3	1	2	1	1	1	1	1	1	1	1							
8. Blackberries	8	8	8	7	1	8	7	1	7	8	9	9	9	9	1	9	10	10	4	1	9	9	9	10	8	6	3	8	2	2	8							
8. Blueberries	6																																					
8. Cranberries																																						
8. Elderberries																																						
8. Raspberries	2	8	10	10	4	1	8	4	1	8	1	8	8	5	8	10	9																					
8. Strawberries	7	7	9	6	2	3	9	10	4	7	7	7	7	7	7	7	9	5	9																			
8. Apples	10																																					
8. Cherries																																						
8. Peas	4	9	4	10	4	8	9	8	8	8	8	9	4	9	8	8	7	7	4	1	7	4	1	5	1	2	3	7	7	2	7	2	6	6				
8. Plum	9	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8			
8. Chives																																						
8. Cilantro																																						
8. Dandelion																																						
8. Dill	8	1																																				
8. Garlic	10																																					
8. Mint	7																																					
8. Parsley																																						
8. Summer Savory																																						
8. Thyme	1	1																																				
8. Watercress																																						
8. Beets																																						
8. Broccoli	4	5	2	2	6	6	6	6	4	5	6	4	5	5	6	2	6	2																				
8. Cabbage																																						
8. Corn	4	4	4	4	5	4	5	4	5	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
8. Cucumber	3	4	3	2	3	2	3	2	3	5	1	1	1	1	1	6	4	6	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		
8. Fiddlehead																																						
8. Kale	6	2																																				
8. Lettuce																																						
8. Mache	5	3	3	3	8	5	1	7	4	7	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
8. Onions																																						
8. Peas																																						
8. Rhubarb																																						
8. Chestnuts	6	4	3	7	6	4	3	7	6	4	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
8. Hazelnuts																																						
8. Rose Hips	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2		
8. Sugar Maple																																						
9. Comm. Gardens	1	1	1	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		









## Appendix H: Questionnaire Results

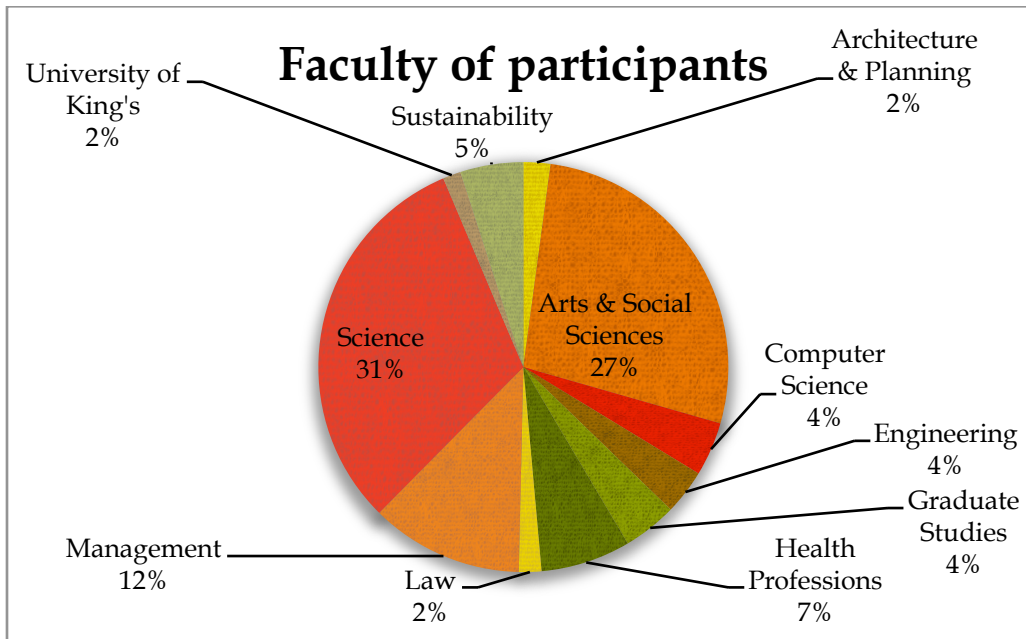
---

1. In what department are you currently enrolled? \_\_\_\_\_

Results:

<b>Faculty</b>	<b>Frequency</b>	<b>%</b>
Architecture & Planning	3	2.1
Arts & Social Sciences	38.5	27.3
Computer Science	6	4.2
Engineering	5	3.5
Graduate Studies	6	4.2
Health Professions	10	7.1
Law	2.5	1.8
Management	17	12.1
Science	44	31.2
University of King's	2	1.4
Sustainability	7	5
<b>Total</b>	<b>141</b>	<b>99.9</b>

(Half points given to each part of a double major)



2. On a scale of 1 - 4, how would you rate your interest in eating food grown on campus: (Circle one)

1 - Not Interested

2 - Somewhat Interested

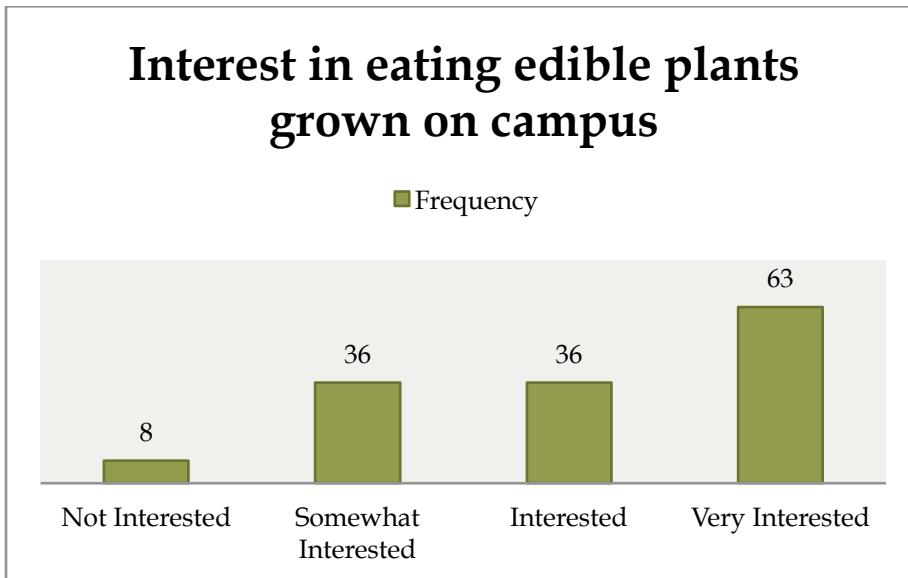
3 - Interested

4 - Very Interested

Results:

Interest in edible plants on campus	Frequency	%
Not Interested	8	5.6
Somewhat Interested	36	25.2
Interested	36	25.2
Very Interested	63	44
<b>Total</b>	<b>143</b>	<b>100</b>





3. Would the presence of edible plants such as fruit trees, nut trees, vegetables and herbs on campus improve your perception of Dalhousie University? (Check one)

- Yes
- No
- Not sure

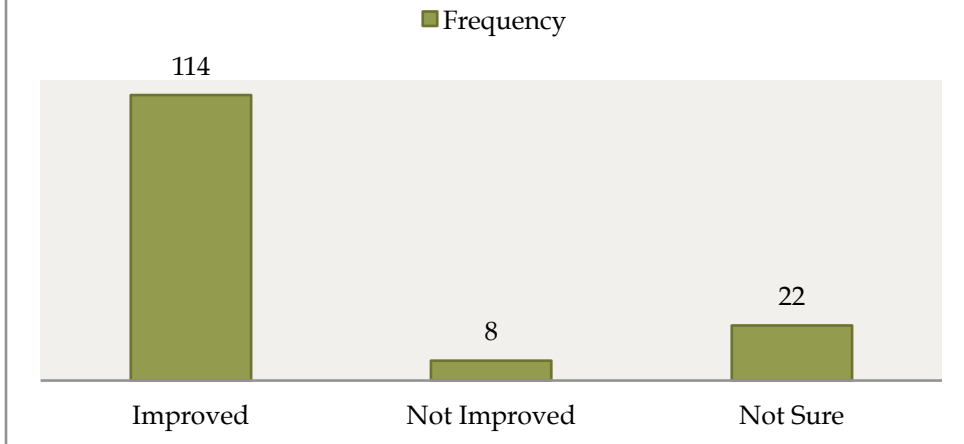
Please explain \_\_\_\_\_

—

Results:

Perception of Dalhousie	Frequency	%
Improved	114	79.1
Not Improved	8	5.6
Not Sure	22	15.3
<b>Total</b>	<b>144</b>	<b>100</b>

## Perception of Dalhousie with implementation of edible plants



### Written responses with "Yes" checked:

- I love fruit and nuts, but worry about those with nut allergies.
- Better food, caring about sust, it's key.
- It would making more exciting.
- It would be neat to go to a university which grows its own food.
- Locally grown, sustainable.
- Environmental friendly, and just plain cool.
- Would make campus look prettier and a healthier perception
- I like seeing growing fruits.
- Would make the school a lot more organic.
- Represent being environmentally friendly.
- More appealing usually, more interesting plants.
- Because the campus will look more appealing & healthy.
- It demonstrates environmental concern.
- That would be the best?
- Free food grown on campus would be sweet.
- Will make the campus prettier.
- Local food is a crucial part of sustainable living.
- Dal is too...open!
- Makes the world beautiful.
- Makes Dalhousie seem environmentally friendly and encourages
- Makes Dal seem progressive + environmentally aware
- It shows that the university cares about healthier choices
- Dalhousie already is making an effort towards a more sustainable campus from Mona Campbell building... etc. The edible plants show an effort towards

sustainability can only help Dal's reputation especially in the current global effort to improve sustainability.

- It would be more friendly
- It would be fresh!
- Edible landscapes bring beauty AND food!!!
- It would seem pleasant and welcoming.
- Sustainable
- More environmentally sustainable place.
- If it was accessible 24/7
- It would look nice and would be a great way of having local food
- More natural and environmental
- More interesting & colourful
- Sustainable living, cool idea!
- Advocating for healthy eating, probably a good thing.
- Environmentally conscious campus
- Just aesthetics
- Looks nice
- I'm trying to eat healthier
- It would be pretty
- It's cool, nice snack, healthy
- Unique
- Free apples! Sustainable campus
- It would be beautiful and practical, especially if students are allowed to use them/participate in maintaining them. A healthy food source.
- Perhaps viewed as a healthier campus
- Healthier
- It would be pretty and fresh fruit/veggies would be yummy!
- They're aesthetically appealing! Also would support the Ladle.
- Beauty, sustainability, low (no) transportation
- Do I really have to? It's awesome
- Forward thinking – localize food!
- I'm very interested in urban agriculture as a way of integrating the built & natural environment
- Plant life is aesthetically pleasing
- That would be sweet!
- I like local food!
- Better for the environment
- Dalhousie would be more actively involved in providing ways to better health
- Very sustainable
- More environmental awareness and community engagement
- Like home. As long as students could have the fruits :)
- Greener Campus (?) I guess... & also unique
- Would make for a nicer campus
- It would create an awesome atmosphere
- It would make Dal seem more progressive

- Higher sensitivity towards whole foods and agriculture
- Native edible plants would be grand, and very much aid in connecting people to food =)
- I would love these
- I think sustainable, local food is vital to our community and I think Dal should be a community leader in this issue
- It would increase the positive atmosphere and aesthetics of the university
- I would consider Dalhousie as a positive place to come to
- Seeing this on campus would make me more likely to perceive Dal as a sustainable campus (a university committed to sustainability =)
- It smells so good and its pleasant to look at and its yummy =)
- Shows Dal cares more about environmental issues
- Good idea to be unique campus
- Proves Dal is enviro friendly and locally interested
- More aesthetically beautiful; gives impression of better food sovereignty/ self-sustenance
- It would feel more natural, warm
- Interesting idea
- I would be awesome
- I like fruit
- It would show a commitment to food education

Written responses with “No” checked:

- A tree is good enough.
- City pollution detrimental on fruit quality? Dalhousie has many other problems needing improvement first.
- No a personal interest
- My perception depends more on the quality of education

Written responses with “Not Sure” checked:

- Depends on how it was marketed, how farming practices were executed.
- Still there is no enough fruit and vegetables around on the campus.
- Depends on access and cost
- I think Dalhousie would still be associated with teaching/profs/etc.
- Never thought of this before but it would prob. change my perc. Positively.
- Somewhat, if they are maintained nicely
- Indifferent
- It isn't my priority
- I feel I already have an improved perception
- I'd eat it...
- It would be good though for promoting healthy eating/lifestyle

4. What kinds of edible plants would you be interested in consuming on campus?

Please rank from 1 – 5 in order of preference; 1 being most preferred, 5 being least preferred:

\_\_\_ Berries (blueberries, blackberries, etc.)

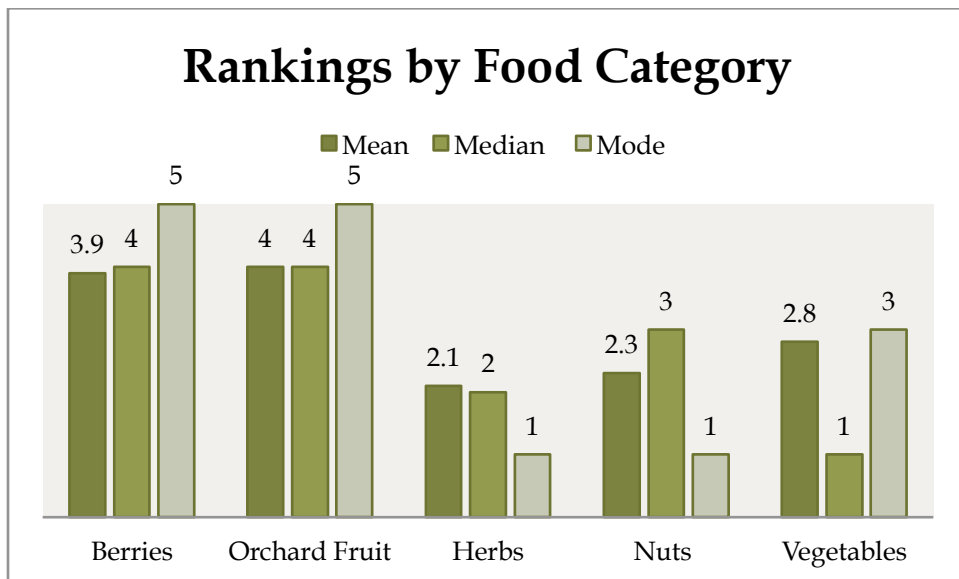
\_\_\_ Orchard Fruit (apples, pears, etc.)

\_\_\_ Herbs (chives, garlic, etc.)

\_\_\_ Nuts (hazelnuts, chestnuts, etc.)

\_\_\_ Vegetables (kale, broccoli, beets, etc.)

Results:



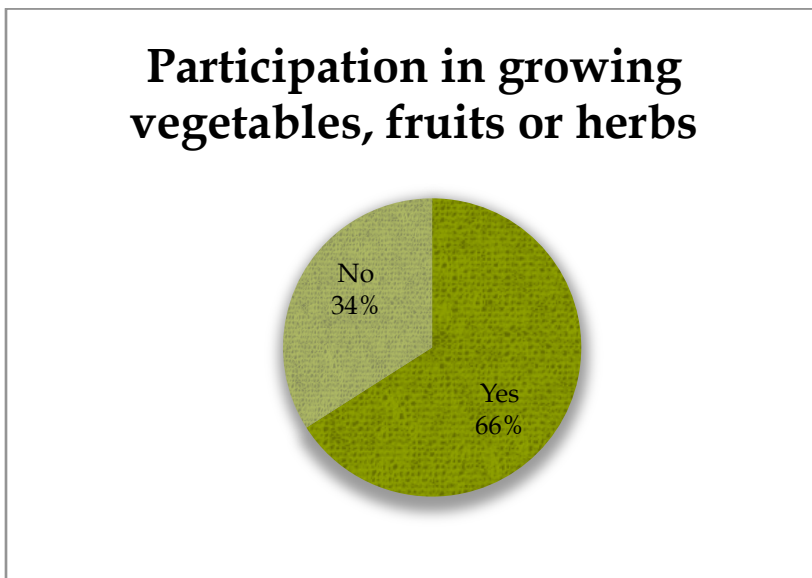
5. Have you ever participated in growing vegetables, fruits or herbs? (Check one)

Yes

No

Results:

<b>Experience Growing Plants</b>	<b>Frequency</b>	<b>%</b>
Yes	95	66
No	49	34
<b>Total</b>	<b>144</b>	<b>100</b>



6. In the next academic year (September 2013 to September 2014), which semesters do you plan on living in Halifax? (Check all that apply)

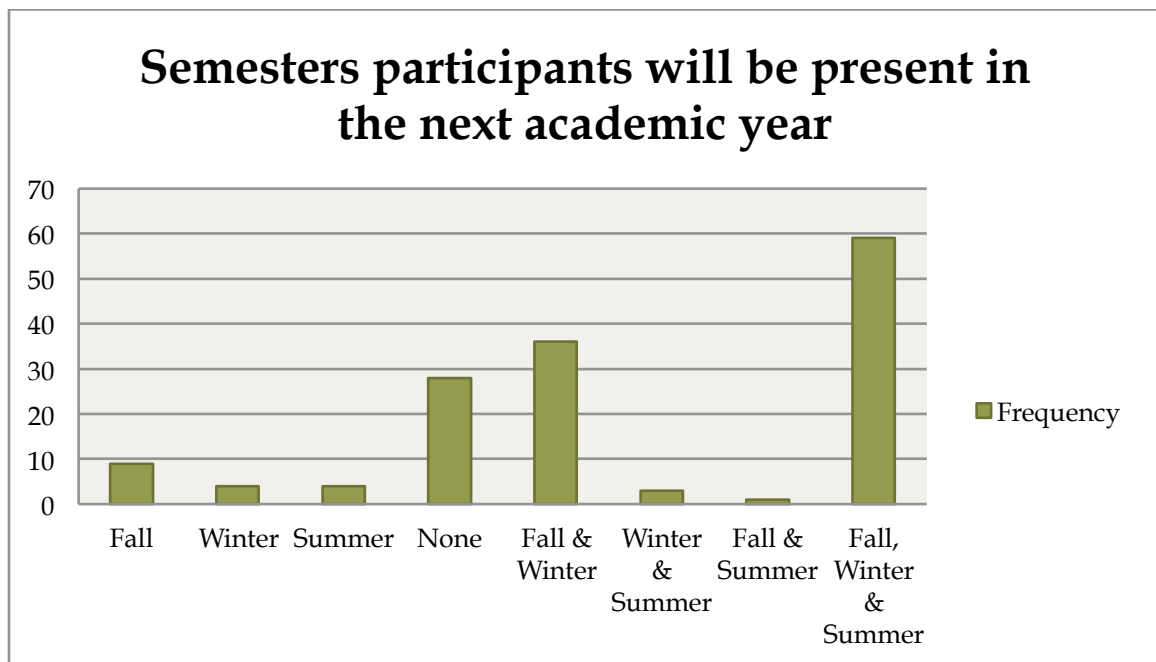
Fall

Winter

- o Summer
- o None

Results:

Semesters in Halifax	Frequency	%
Fall	9	6.3
Winter	4	2.8
Summer	4	2.8
None	28	19.4
Fall & Winter	36	25
Winter & Summer	3	2
Fall & Summer	1	0.7
Fall, Winter & Summer	59	41
<b>Total</b>	<b>144</b>	<b>100</b>

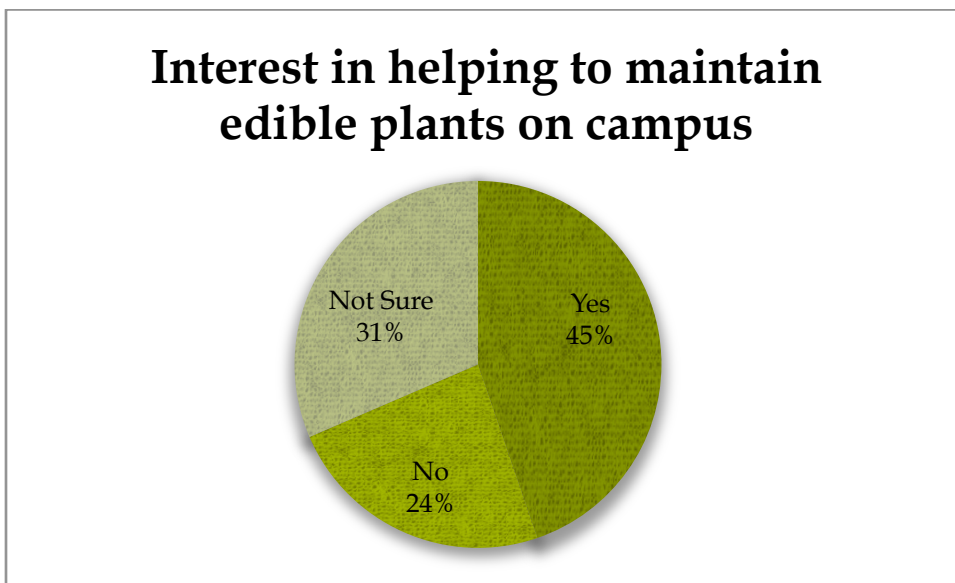


7. Would you be interested in helping to maintain edible plants on campus?

- o Yes
- o No
- o Not sure

Results:

Interest in Helping	Frequency	%
Yes	64	45
No	34	24
Not Sure	45	31
<b>Total</b>	<b>143</b>	<b>100</b>



8. Which edible plants would you be most interested in consuming?  
Please rank only your **TOP 10** choices from any of the categories in order of preference, with 1 being most preferred:

**Berries**

**Fruit Trees**



\_\_\_ Blackberries

\_\_\_ Blueberries

\_\_\_ Cranberries

\_\_\_ Elderberries

\_\_\_ Raspberries

\_\_\_ Strawberries

### **Herbs**

\_\_\_ Chives

\_\_\_ Cilantro

\_\_\_ Dandelion

\_\_\_ Dill

\_\_\_ Garlic

\_\_\_ Mint

\_\_\_ Parsley

\_\_\_ Summer Savory

\_\_\_ Thyme

\_\_\_ Watercress

### **Nuts**

\_\_\_ Apples

\_\_\_ Cherries

\_\_\_ Pears

\_\_\_ Plum

### **Vegetables**

\_\_\_ Beets

\_\_\_ Broccoli

\_\_\_ Cabbage

\_\_\_ Corn

\_\_\_ Cucumbers

\_\_\_ Fiddleheads

\_\_\_ Kale

\_\_\_ Lettuce

\_\_\_ Mache

\_\_\_ Onions

\_\_\_ Peas

\_\_\_ Rhubarb

### **Other**

\_\_\_Chestnuts

\_\_\_Rose Hips

\_\_\_Hazelnuts

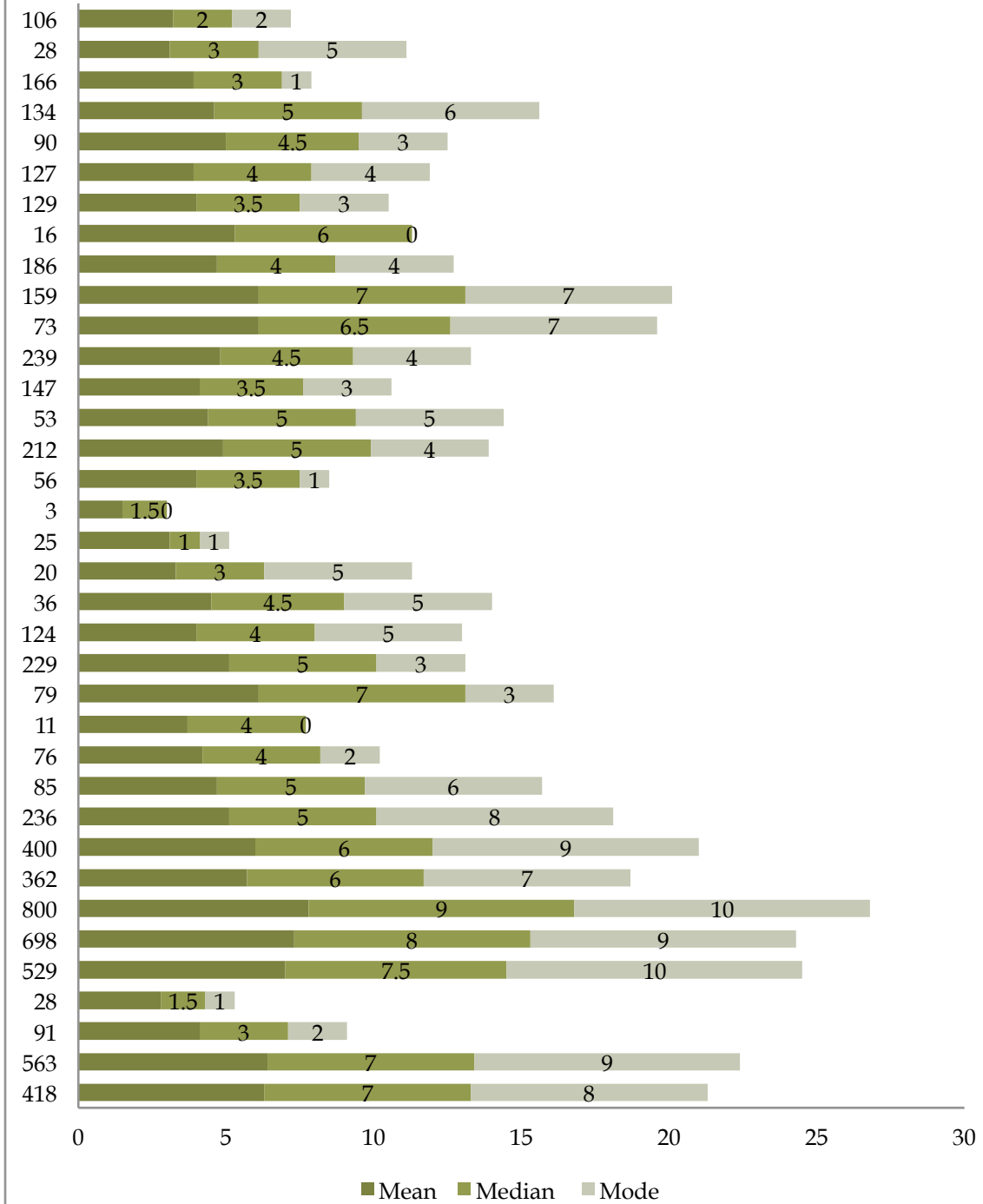
\_\_\_Sugar Maple

Results:

	<b>Rank Score</b>	<b>Mean</b>	<b>Median</b>	<b>Mode</b>
Blackberries	418	6.3	7	8
Blueberries	563	6.4	7	9
Cranberries	91	4.1	3	2
Elderberries	28	2.8	1.5	1
Raspberries	529	7	7.5	10
Strawberries	698	7.3	8	9
Apples	800	7.8	9	10
Cherries	362	5.7	6	7
Pears	400	6	6	9
Plum	236	5.1	5	8
Chives	85	4.7	5	6
Cilantro	76	4.2	4	2
Dandelion	11	3.7	4	n/a
Dill	79	6.1	7	3
Garlic	229	5.1	5	3
Mint	124	4	4	5
Parsley	36	4.5	4.5	5
Summer Savory	20	3.3	3	5
Thyme	25	3.1	1	1
Watercress	3	1.5	1.5	n/a
Beets	56	4	3.5	1
Broccoli	212	4.9	5	4
Cabbage	53	4.4	5	5
Corn	147	4.1	3.5	3
Cucumber	239	4.8	4.5	4
Fiddlehead	73	6.1	6.5	7
Kale	159	6.1	7	7
Lettuce	186	4.7	4	4
Mache	16	5.3	6	n/a
Onions	129	4	3.5	3
Peas	127	3.9	4	4

Rhubarb	90	5	4.5	3
Chestnuts	134	4.6	5	6
Hazelnuts	166	3.9	3	1
Rose Hips	28	3.1	3	5
Sugar Maple	106	3.2	2	2

## Mean, Median & Mode of Rank Scores for Individual Plants



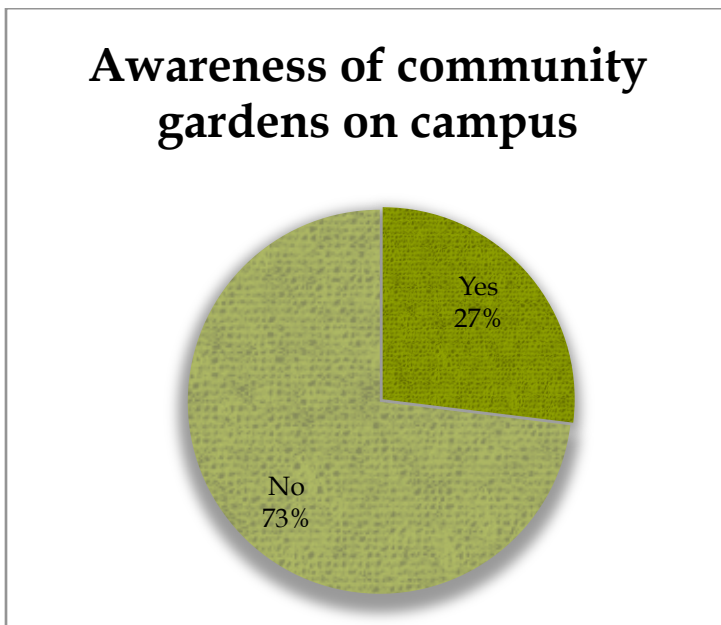
9. Are you aware of the community gardens on Studley Campus? (Check one).

Yes

No

Results:

Awareness of Dal Community Garden	Frequency	%
Yes	38	27
No	103	73
<b>Total</b>	<b>141</b>	<b>100</b>



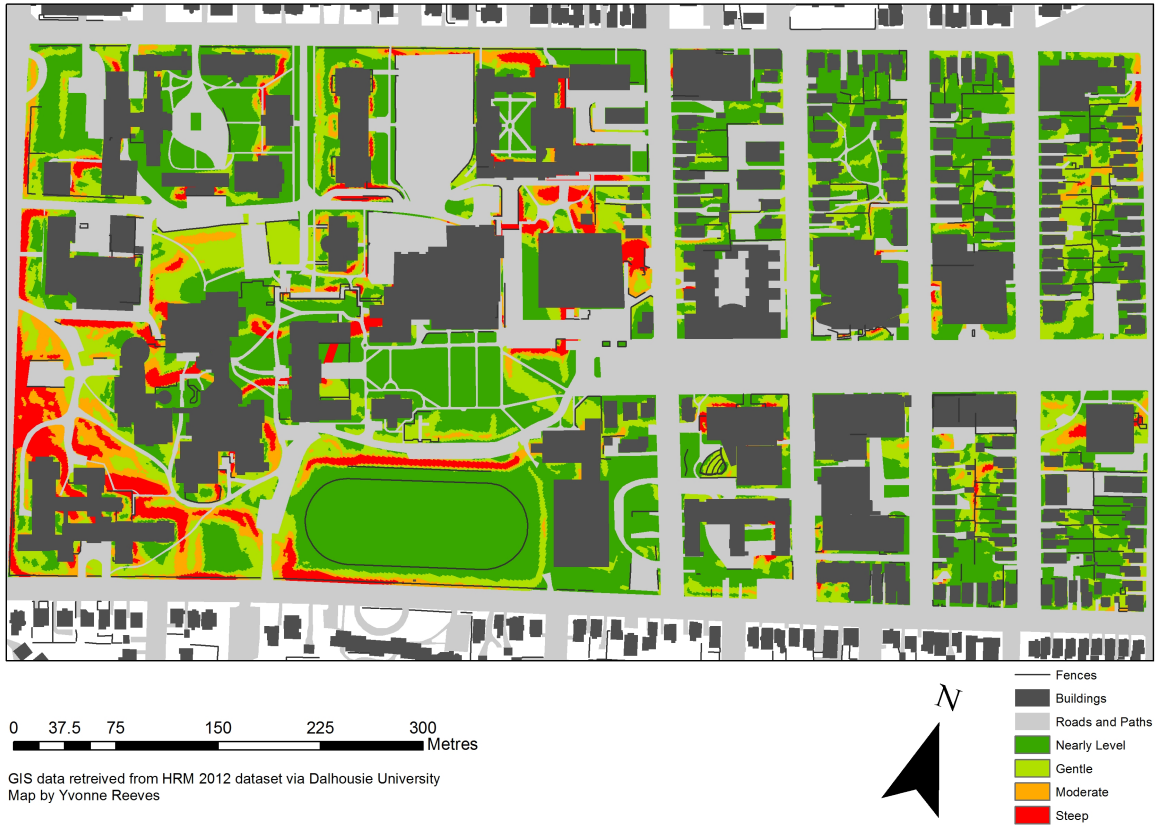
## Appendix I: DSUSO Suggested Sites

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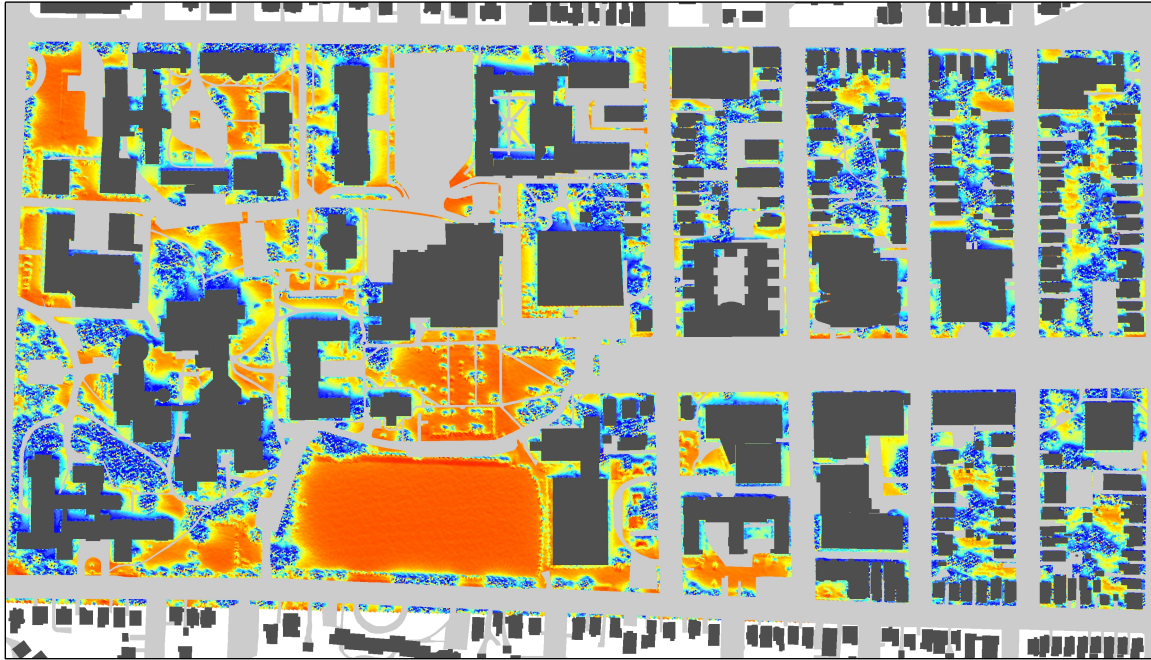
Sites suggested by DSUSO for edible landscaping:

- All around the Henry Hicks building
  - Between the Henry Hicks building and the Life Sciences Centre
  - The planter in front of the Killam Memorial Library
  - Around the Student Union Building
  - The median between the lanes of University Avenue (in the future if Dalhousie purchases it from the City)
  - Around the Life Sciences Centre
  - The lawn around the McCain Building
-

## Studley Campus: Slope



# Studley Campus: Solar Radiation



0 37.5 75 150 225 300 Metres

GIS data retrieved from HRM 2012 dataset via Dalhousie University  
Map by Yvonne Reeves



Solar Radiation

WH/m<sup>2</sup>

High : 982996

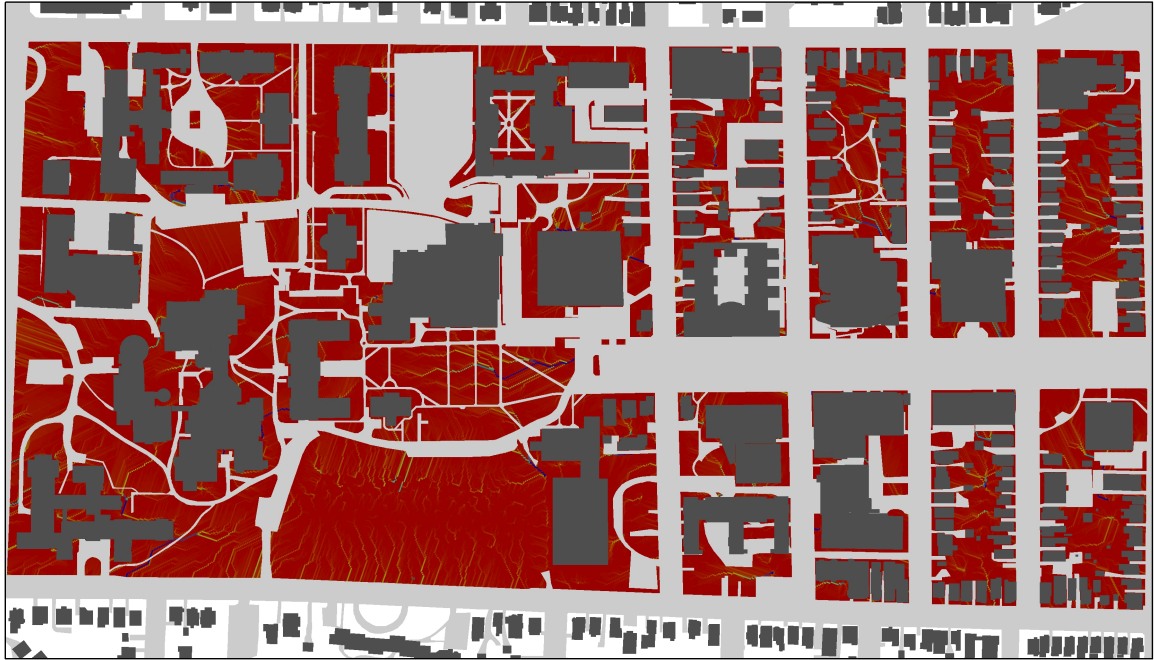
Low : 129.653

Grey Roads and Paths

Black Buildings

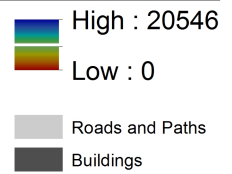


# Studley Campus: Hydrology

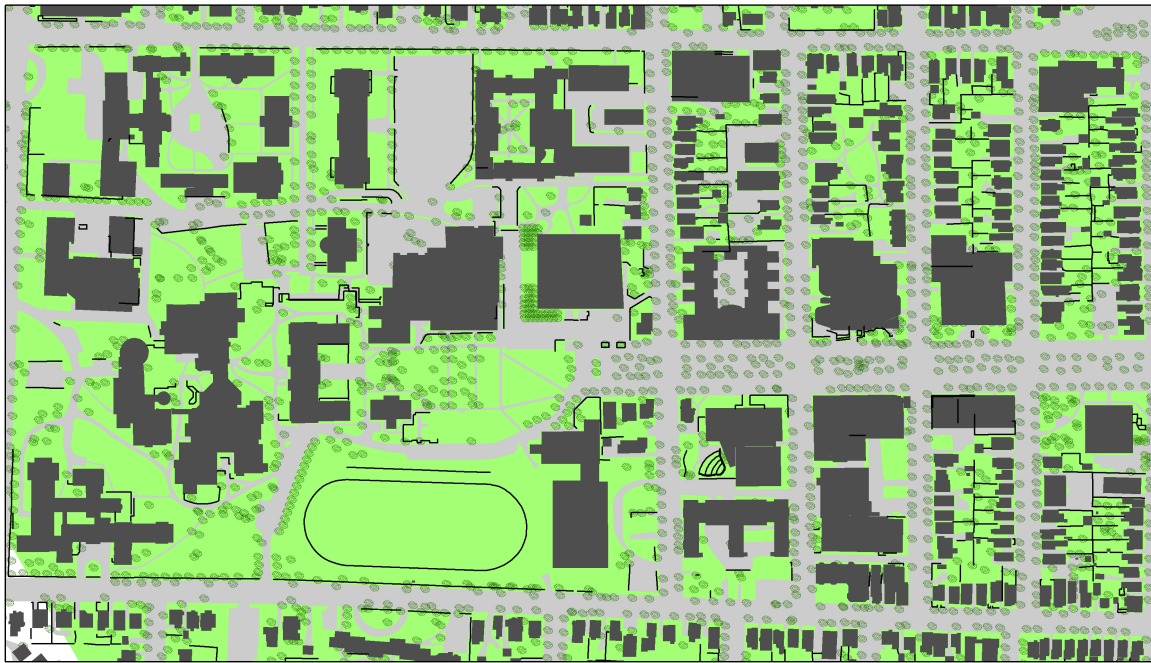


0 37.5 75 150 225 300 Metres

GIS data retrieved from HRM 2012 dataset via Dalhousie University  
Map by Yvonne Reeves



# Studley Campus Tree Cover



0 37.5 75 150 225 300 Metres

GIS data retrieved from HRM 2012 dataset via Dalhousie University  
Map by Yvonne Reeves



- Trees
- Fences
- Buildings
- Roads and Paths
- Open Space

## Appendix K: Funding Proposal

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### Student Project Funding Proposal Form

#### DSU Sustainability Office

#### **Project Title**

SUST 3502 Research Project: Edible Campus

#### **Goal**

To investigate the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley Campus landscape.

#### **Justification**

The information gathered from this project could be used to support the argument that an edible campus will help Dalhousie University to achieve its goals of promoting sustainability, and drawing people to the university through its sustainable activities, as stated in the Dalhousie University Sustainability Plan (2010). The project may demonstrate one way in which the university can operationalize the following indicators of sustainability as laid out in this plan: enhanced urban biodiversity, and sustainable food options. Another goal of the university that may be fulfilled, stated in the Dalhousie University Climate Change Plan (2010), is to incorporate native trees into the natural environment on campus. This project will inform decisions made by DSUSO, and potentially Dalhousie University, of the probability of incorporating edible plants into the Studley Campus landscape.

#### **Description**

- The stakeholders involved are:
  - The proponents: the Edible Campus Research team (5 students)
  - The beneficiary: DSUSO
  - Contact Person: Melissa Le Geyt (mjlegeyt@gmail.com / 789-8484)
- The actions you plan to undertake (these must directly address the issue(s) described above.

- Interview relevant professionals about what edible plants would be best for Dalhousie campus and where would be best to plant them.
- Administer a survey to students about what edible plants they would want on campus and how much they would use them.
- Identify potential areas for edible plant addition
- Compile a report with the results of the feasibility analysis
  - Provide a rough schedule for the implementation of the proposed initiative.

### March

- 6 -Finalize Interview Questions & Contact Interviewees
- 13 -Interviews Complete
- 14 -Student Surveys (11am-1pm) & Analyze Interview Data
- 15 -Report & Student Surveys (10am-12pm)
- 16 -Student Surveys (2pm-4pm)
- 18 -Compile & Analyze Survey Data

### April

- 12 -Final Report due

### **Budget**

\$100 (food)

\$30 (printing)

Total: \$130

The money will be used to buy “food incentives” (we are thinking cookies) to encourage students to complete a survey, as well as to help cover costs associated with printing the surveys.

### **Monitoring**

- Do you agree to submit a follow-up report detailing the successes and failures of the proposed initiative? (Please realize that failure will not rule out your organization for future funding consideration).

Yes

Submit 1-2 page proposal to the Dalhousie Student Union Sustainability Office at dsuso@dal.ca or the drop box on our door (second floor by the student exec offices).

\*Please note: If you receive a grant you must provide feedback on your experience. This can come in the form of a written report or a visual presentation.

# Appendix L: Ethics Review

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## ENVIRONMENTAL SCIENCE PROGRAM

### FACULTY OF SCIENCE

### DALHOUSIE UNIVERSITY

(version 2010)

## **APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS**

### **GENERAL INFORMATION**

**1. Title of Project:** Edible Campus

**2. Faculty Supervisor(s)**

Tarah Wright **Department:** Environmental Science **e-mail:** Tarah.Wright@dal.ca **ph:** 902-494-3683

Lauri Lidstone **Department:** School for Resource and Environmental Studies **e-mail:** lauri.lidstone@dal.ca **ph:**

**3. Student Investigator(s)**

Monica Belliveau **Department:** Planning & Sustainability **e-mail:** mn512509@dal.ca **ph:** 902-802-0389

Yvonne Reeves **Department:** Planning & Sustainability **e-mail:** yv758096@dal.ca **ph:** 902-221-2969

Ryan MacLean **Department:** Planning & Sustainability **e-mail:** maclearj@dal.ca **ph:** 902-441-4843

Melissa Le Geyt **Department:** IDS & Sustainability **e-mail:** mjlegeyt@gmail.com **ph:** 902-789-8484

Erika Woolgar **Department:** English & Sustainability **e-mail:** er796358@dal.ca **ph:** 902-981-4537

**4. Level of Project:** Non-thesis Course Project [ x ] Undergraduate [ x ] Graduate [ ]  
**Specify course and number:** 3502 ENVS/SUST Campus as a Living Lab

**5. a. Indicate the anticipated commencement date for this project: March 1, 2013**

**b. Indicate the anticipated completion date for this project: April 12, 2013**

## **SUMMARY OF PROPOSED RESEARCH**

**1. Purpose and Rationale for Proposed Research:** *Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated*

The purpose of this project is to investigate the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley Campus landscape. The food grown from these plants would be free and available to all who use the space. The research project was requested by the Dalhousie Student Union Sustainability Office (DSUSO).

The question we will be answering is: what are the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, on Dalhousie's Studley Campus landscape?

## **2. Methodology/Procedures**

**a. Which of the following procedures will be used? Provide a copy of all materials to be used in this study.**

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify: Geographic Information Systems (GIS)

**b. Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.**

*GIS, Horticulture Interviews, Maintenance interviews, Student Surveys*

**3. Participants Involved in the Study: Indicate who will be recruited as potential participants in this study.**

Dalhousie Participants:

- Undergraduate students
- Graduate students
- Faculty and/or staff

Non-Dal Participants:

- Adolescents
- Adults
- Seniors
- Vulnerable population\* (e.g. Nursing Homes, Correctional Facilities)

*\* Applicant will be required to submit ethics application to appropriate Dalhousie Research Ethics Board*

**b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.**

*Potential interview participants include adults working for the Ecology Action Centre and Common Roots Urban Farm as well as professors working for Dalhousie University and university maintenance staff. Potential participants for the survey are Dalhousie Students of all genders.*

**c. How many participants are expected to be involved in this study? 144 students and 7 professionals (See Appendix for names of professionals)**

**4. Recruitment Process and Study Location**

**a. From what source(s) will the potential participants be recruited?**

- Dalhousie University undergraduate and/or graduate classes
- Other Dalhousie sources (specify) professors and staff
- Local School Boards\*
- Halifax Community
- Agencies
- Businesses, Industries, Professions
- Health care settings\*
- Other, specify (e.g. mailing

lists) \_\_\_\_\_ *\* Applicant may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.*



**b. Identify who will recruit potential participants and describe the recruitment**

**process.** Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts in the appendices section.

*Surveys will be conducted in person, people will be approached by members of the group and offered a food incentive to fill out a survey.*

*Interview participants will be contacted by e-mail and phone in order to set up a meeting time.*

**5. Compensation of Participants: Will participants receive compensation (financial or otherwise) for participation?**

**Yes [x] No [ ]** If Yes, provide details: *Survey participants will be offered a food incentive (cookie) for completing the survey.*

**6. Feedback to Participants**

**Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.** Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement. Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

N/A

**POTENTIAL BENEFITS FROM THE STUDY**

**1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.**

*Survey participants will receive food as an incentive for completing the survey.*

**2. Identify and describe any known or anticipated benefits to society from this study.**

*The Edible Campus will allow students easy and free access to healthy, campus-grown food, in addition to serving as a learning tool for future students. The study will also contribute to the overall biodiversity on Studley campus, and add to the ecological integrity of the site as a whole.*

**POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY**

1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors and burdens.

No known or anticipated risks Explain why no risks are anticipated:

Minimal risk \* Description of risks: *The surveys will be anonymous and do not ask for personal information. Interviews with professionals only ask for opinions on plant suitability and do not include personal questions. Food allergies will need to be considered with regards to the food incentive.*

Greater than minimal risk\*\* Description of risks:

*\* This is the level of risk associated with everyday life. \*\* This level of risk will require ethics review by appropriate Dalhousie Research Ethics Board*

2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.

*No personal information will be asked from any participants involved in the study. Surveys will remain anonymous to protect the privacy of survey participants. A list of ingredients for the cookies being given out as a food incentive will be shown to any participants who raise concerns about food allergies.*

### **INFORMED CONSENT PROCESS**

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>;

1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?

Information letter with written consent form; provide a copy

Information letter with verbal consent; provide a copy

Information/cover letter; provide a copy

Other (specify) After explaining the study to potential participants by using a script detailing the study and the participant's involvement. If they decide to continue with the survey they are then freely giving their consent to participate. If a person decides to withdraw from the survey they will not be pushed to continue.

2. If written consent cannot be obtained from the potential participants, provide a justification.

*A script will be used when approaching survey participants. It explains the project and how the information they provide will be analyzed and used in the study. Consent for individual interviews will not be needed as the opinions of interview participants will not be asked; questions ask for facts about plants and practical matters involved in implementing edible plants rather than personal opinions.*

### **ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA**

#### **1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.**

*In order to ensure anonymity of participants no names will be collected during the surveying process. Data from the surveys will be compiled and analyzed as a group from a frequency table so that no surveys are published individually.*

#### **2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.**

*The information gathered from surveys will not be distributed outside of the group conducting this study. Audiotapes and notes obtained during interviews will not be made available outside of the group conducting this study.*

#### **3. Indicate how long the data will be securely stored as well as the storage location over the duration of the study. Also indicate the method to be used for final disposition of the data.**

- Paper Records
- Confidential shredding after the completion of the study (April 13, 2013)
- Data will be retained until completion of specific course.
- Audio/Video Recordings
- Erasing of audio/video tapes after the completion of the study (April 13, 2013)
- Data will be retained until completion of specific course.
- Electronic
- Erasing of electronic data after \_\_\_\_\_
- Data will be retained until completion of specific course.
- Other \_\_\_\_\_

*All surveys, interview notes and interview recordings will be disposed of upon completion of the study. This information will not be shared outside of the study group and group mentor. Until the end of the study surveys and notes will be held in a secure folder and audio information will be kept on an audio recording device.*

**Specify storage location:** *The home of one of the group members.*

**Appendices: ATTACHMENTS** Please **check** below all appendices that are attached as part of your application package:

**Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.

**Information Letter and Consent Form(s).** Used in studies involving interaction with participants (e.g. interviews, testing, etc.)

**Information/Cover Letter(s).** Used in studies involving surveys or questionnaires.

**Materials:** A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

**SIGNATURES OF RESEARCHERS**

Signature of Student Investigator(s) Date

*Monica Belliveau Feb. 21, 2013*

Signature of Student Investigator(s) Date

*Ryan MacLean Feb. 21, 2013*

Signature of Student Investigator(s) Date

*Melissa Le Geyt Feb. 21, 2013*

Signature of Student Investigator(s) Date

*Yvonne Reeves Feb. 21, 2013*

Signature of Student Investigator(s) Date

*Erika Woolgar Feb. 21, 2013*

**FOR ENVIRONMENTAL SCIENCE PROGRAM USE ONLY:** Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

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Signature      Date

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# Research Proposal: Edible Campus Plan

## Project Definition

The purpose of this project is to investigate the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley Campus landscape. Edible landscaping is the process of incorporating food-producing plants and trees into the existing environment (Thai 2009). The food grown from these plants would be free and available to all who use the space. The research project was requested by the Dalhousie Student Union Sustainability Office (DSUSO). DSUSO works to promote sustainable practices and culture within the DSU and at Dalhousie (DSUSO, 2012). The Office recently celebrated the opening of a Dalhousie campus garden behind the Goldberg Computer Science Building, and wants to see the addition of more edible landscaping.

The question we will be answering is: what is the desirability and what are the opportunities and constraints of implementing and maintaining edible plants, native or adapted to Nova Scotia, into Dalhousie's Studley Campus landscape?

Due to the timeframe of the project, it was necessary to narrow the scope; consequently the project will look specifically at edible landscaping on Studley Campus. This delimitation was chosen because Studley Campus has the most potential for edible landscaping and a high density of students. Previous projects have been conducted on the campus, thus providing information to inform the research. Additionally, our group is the most familiar with the Studley Campus landscape, making it easier to navigate.

Other delimitations for the project include the sample size for questionnaires, and our decision not to collect new soil samples. A manageable and realistic sample size was chosen for the data collection from student questionnaires, based on the time and

human resources available. Soil sample collection was not a priority for the project as recent soil data exists, and thus was deemed unnecessary.

In addition to the delimitations, there are a number of limitations beyond the control of this study, including the feasibility of polling all students, the accuracy of GIS data, and the availability of group members. The inability to poll all students (which detracts from obtaining a full representation of student desirability) is due to the impossibility and impracticality of such a sample size. Another limitation is the GIS data itself; occasionally files are not 100% accurate, because either the landscape has undergone change since the file was created or there was human error involved in the generation of the data file(s). And finally, the limitation of group availability; all group members are enrolled in full-time study and have a number of time constraints to navigate, posing some challenges.

## Background & Rationale

Critics of the global food system argue that society's disengagement (and disempowerment) from the production, processing and transportation of our food is a result of extreme commodification of food and the increasing distance between food producers and consumers (Lucy, 2000). Globally, there is a growing trend towards urban agriculture and edible landscaping as a means of empowering the local community, improving food security, and enhancing urban biodiversity (van Veenhuizen, 2006).

Cities, organizations, homeowners and post-secondary institutions are all recognizing the benefits of growing their own food. Urban agriculture has been cited as a means of improving food security, health and nutrition by increasing access to fresh fruits and vegetables (Nasr & Smit, 1992; van Veenhuizen, 2006). Additionally, natural design strategies such as edible landscaping have been shown to have positive biological impacts on the urban environment including improved urban biodiversity, habitat creation, resource conservation, productivity, storm water management and nutrient cycling (Dearborn & Kark, 2010; Nasr & Smit, 1992; van Veenhuizen, 2006). In particular, the use of native and adapted species in edible landscaping has been shown to reverse the ecological impacts of urbanization on native biodiversity and local habitats (Goddard, Dougill & Benton, 2010). While there is debate about the impacts of exotic (usually ornamental) species on urban biodiversity, re-establishing native vegetation has been shown to significantly increase the presence and diversity of insect, butterfly and bird species (Burghhardt, K.T. et al., 2009). Additionally, in the context of sustainability, native and adapted plants are generally hardier and require far less in terms of

maintenance and inputs (such as water, fertilizer and pesticides) than non-native species (Harper-Lore, 1996). Low maintenance edible landscaping combines elements of the natural environment with conventional landscaping motifs in order to produce a result that is aesthetically appealing (Beck, Heimlich & Quigley, 2002). On a social level, edible landscaping provides a means of greening and enhancing urban spaces, improving quality of life and empowering inhabitants by allowing them to reconnect with nature and their food (Shwartz et al. 2012; van Veenhuizen, 2006).

Increasingly, universities and colleges across Canada, including Dalhousie University, are recognizing the social and ecological benefits of incorporating edible plants on campus landscapes. McGill University implemented an award-winning edible garden in 2007 (McGill, 2012). Their garden, a 120m<sup>2</sup> container, was a combined effort of the university and two local NGOs. It produced one ton of produce in 2010, and is currently being expanded (McGill, 2012). The University of Victoria has a long-standing history of campus gardens, one of which is a campus community garden run by a student group (UVic, 2009). This garden offers 90 plots for rental by students, staff, and community groups, and has proven itself to be a community-building and educational tool (UVic, 2009). Another organization that is making great progress in small-scale, local gardening is the London Orchard Project. This organization develops small orchards around the city of London, England, utilizing unused urban space, increasing biodiversity, and reconnecting people with their food (The London Orchard Project, 2012). To date they have planted 37 community orchards and have partnered with local authorities and local groups to cultivate community and share agricultural skills, with great success (The London Orchard Project, 2012). These case studies showcase only a small sample of urban agriculture projects.

Dalhousie University, through DSUSO, has expressed interest in edible landscaping, and has made progress through their support of two community gardens on campus, one of which contains fruit tree installations. This project aims to build on previous research and case studies from other universities to determine the opportunities, benefits and constraints of incorporating more edible plants on the Studley Campus landscape.

Incorporating edible plants on campus is in accordance with Dalhousie's *Natural Environment and Landscaping Policy and Guidelines* (2012), which expresses a desire to both enhance the aesthetic quality of the campus landscape while preserving and improving its ecological integrity. Another stipulation of the University's landscaping plan is that "design quality, character, landscape materials and plant communities contribute significant social, economic, and environmental value to the University and

the larger community” (p.3). Edible landscaping is an alternative to ornamental gardening, as it can provide significant aesthetic appeal while requiring far less maintenance and fewer inputs, particularly when incorporating native or adapted plants (Beck, Heimlich & Quigley, 2002).

An intended outcome from this project is to provide DSUSO with research and information about the desirability, opportunities and constraints of incorporating edible plants into the landscape of Dalhousie’s Studley Campus. The information gathered could be used to support the argument that an edible campus will help Dalhousie University achieve its goals of promoting sustainability, and attracting students to the university through its sustainable activities, as stated in the *Dalhousie University Sustainability Plan* (2010). The project may demonstrate one way in which the university can operationalize the following indicators of sustainability as laid out in this plan such as: enhanced urban biodiversity, and the provision of sustainable food options. Another goal, as stated in the *Dalhousie University Climate Change Plan* (2010), is to incorporate native trees into the natural environment on campus. This project will inform decisions made by DSUSO, and potentially Dalhousie University, on the possibility of incorporating edible plants into the Studley Campus landscape.

## Research Methods

The information required to answer the research question includes:

Do students want to see edible plants added to the landscape?

What types of native and/or adapted plants (if any) are desired by students?

What locations are most suitable for edible plants?

Who will maintain the plants? How?

This information will help to determine the desirability of the project, the optimal locations for native and adapted edible plants on Studley Campus, and how feasible the implementation and maintenance of the chosen groups of plant species would be. In addition to a literature review, information will be gathered by mapping



using Geographic Information Systems (GIS), through interviews with facilities managements and horticulturalists, and from student questionnaires.

## Geographic Information System (GIS)

A Geographic Information System (GIS) “integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information” (Esri, n.d.). It allows for the visualization and interpretation of spatial data, in addition to the ability to layer multiple datasets and find relationships (i.e. suitable sites for certain plant species).

Research will begin with the creation of maps of the Studley Campus using GIS, specifically the ArcMap10 program. These maps will display solar aspect, slope, tree cover and hydrology using readily available data layers from the Dalhousie GIS centre. Combining these layers onto one map within the GIS program, will display optimal locations for the edible plants based on the attributes previously discussed. New data layers will be created to show suitable sites.

Maps will be used in conjunction with information gained from interviews with facilities management and horticulturalists to determine potential sites for the addition of edible plants into existing landscaping. A list of sites suggested by DSUSO will also be taken into consideration (Appendix I).

## Interviews

Interviews were chosen as a research tool in order to gather qualitative data regarding appropriate edible plants for the Dalhousie landscape as well as maintenance procedures on campus.

Although the nature of the information being gathered is not particularly sensitive, it is still important to ensure data from interviews is collected in as unbiased a manner as possible. In order to avoid leading the interviewee into making reactive statements or suggestions, researchers will endeavor to remain neutral and deliver questions in a detached and standardized form (Palys and Atchison, 2008). That said, one of the advantages of interviews is that questions can be clarified and elaborated on so that a greater depth of response can be achieved (Palys and Atchison, 2008). In keeping with this, researchers will be open to changing the flow of the discussion based

on the interests of the interviewee, thus increasing the possible breadth and depth of information acquired.

While qualitative interviews are difficult to standardize from a data collection perspective, they remain a valuable tool for obtaining practical information about the day-to-day maintenance of edible plants and Dalhousie's campus grounds.

After identifying the information needed for the study, research was done to create a list of experts in the area of horticulture and planning, as well as staff involved in landscaping on campus, who will be contacted for interviews (Appendix A). Researchers will contact them by email or phone to set up a time to meet. Based on pilot tests of the interview questions it is estimated that each interview will take approximately thirty minutes. Introductory scripts and interview questions can be found in appendices B, C, and D.

The GIS maps, which clarify potential locations where edible landscaping can be implemented, will be shown during interviews with horticulturalists and facilities management. These will help inform the questions asked during each interview. Horticulturalists will be asked specific questions about planting an edible landscape on Studley Campus. We will use these interviews to gain insight into which native plants are the most practical to plant and require the least amount of maintenance. We aim to learn which growing conditions are required for the suggested species and if any structures such as raised beds or fences would be required.

Facilities management will be asked specifically about the maintenance and implementation of plants on campus. The information gathered will help further decide which vegetation and orchard trees would be best to include in our recommendations and to define possible locations for edible landscaping.

Transcripts of interviews will be compiled and analysis will consist of determining what edible plants are appropriate for the recommended sites. A list of suitable plants will be created to inform the options provided in question 8 of the student questionnaire (Appendix G). The interviews will also provide information about the opportunities and constraints of incorporating edible plants into the landscape of Studley Campus more generally.

## Student Questionnaires

With the information on suitable locations, established through GIS mapping, and potential plant choices through interviews and literature review, questionnaires will be used to determine student interest in the project as well as which specific plants students would like to see on campus. Questionnaires were chosen as a research method because the information needed can be obtained through straightforward questions and it will provide the opportunity to obtain an acceptable sample with limited time and budget (Palys and Atchison, 2008). The target group for questionnaires is any students of Dalhousie University, as the addition of edible landscaping will not impact any one faculty or group more than another.

The questionnaires will be administered face-to-face by researchers to the students, as Palys and Atchison (2008) state that it will provide higher response rates and the opportunity to clarify question with respondents. Researchers will use a script (Appendix F) and food incentives to recruit respondents. The questionnaire contains a combination of 1 open-ended and 8 structured questions designed to determine whether students desire to see edible plants included in the landscaping on Studley Campus, and if so, what varieties (Appendix G). The structured questions allow the researchers to cover a lot of ground in a short period of time, while the open-ended question provides insight into a respondent's opinions concerning their perception of Dalhousie University (Palys and Atchison, 2008).

Researchers conducting student surveys will locate themselves at high-traffic areas on campus: the atrium of the Killam Memorial Library and near the entrance of the Student Union Building (SUB). This will ideally allow researchers to catch students at a time when they will not be rushing to classes. Convenience sampling will be used as we do not have a sampling frame for the Dalhousie student population (Palys and Atchison, 2008). To ensure that researchers are not selective about the individuals they approach, they will use a method of selecting every 5th person who passes by (T.Wright, personal communication, February 5, 2013).

Piloting the questionnaire determined that it takes approximately 3 minutes to complete. Adding another 2 minutes to allow for recruitment and any clarification of questions resulted in 5 minutes being allotted for each questionnaire. The group has a maximum of 6 hours to administer questionnaires in two-hour segments between March 14th and 16th (see Schedule below). With two researchers administering the questionnaires, this will allow for a sample size of 144 students.

Upon completion of the questionnaires, frequency tables of responses will be created to display and analyze results. Central tendency, variability and dispersion will also be calculated as well as some inferential statistics if time permits. This data will provide a gauge for student interest for the incorporation of edible plants on campus and rationalization for what species students would prefer to see planted.

## Schedule

### February

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
17	18	19 Group Meeting (Re:Proposal)	20 Work on Proposal	21 Finalize Proposal	22 Draft Proposal Due & Funding Application Submitted	23
24	25	26 Site visits (photographs) & Mapping (GIS)	27	28		

## March

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5 Group Meeting	6 Finalize Interview Questions & Contact Interviewees	7	8 Group Progress Report	9
10	11	12 Group Meeting	13 Interviews Complete	14 Student Surveys (11am-1pm) & Analyze Interview Data	15 Group Progress Report & Student Surveys (10am-12pm)	16 Student Surveys (2pm-4pm)
17	18 Compile & Analyze Survey Data	19 Group Meeting	20	21	22 Group Progress Report	23
24	25	26 Group Meeting	27	28 Pecha Kucha Presentation- Preparation	29 Group Progress Report	30
31  Pecha Kucha slides due						

## April

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2 Pecha Kucha  presentatio n	3	4	5 Group Meeting to Work on Final Report	6
7	8	9 Group Meeting	10	11	12 Final Report due	13

### Responsibilities

**Attending Tuesday group meetings:** All group members

**Progress reports:** Each group member is to inform the others of their progress either electronically or in person on Fridays.

**GIS Mapping:**

- Data collection: Yvonne Reeves, Monica Belliveau, and Ryan MacLean

- Multiple criteria decision analysis: Yvonne Reeves, Monica Belliveau, and Ryan MacLean

- Finalizing maps: Yvonne Reeves, Monica Belliveau, and Ryan MacLean

**Interviews:**

- Contacting interviewees and conducting interviews: Melissa Le Geyt and Yvonne Reeves

- Analysis: Melissa Le Geyt and Yvonne Reeves

**Student Questionnaires:**

- Conducting: 2 group members (alternating shifts)

- Analysis: Monica Belliveau, Ryan MacLean and Erika Woolgar

**Results/Recommendations:** All group members

**Contributing to literature reviews, writing and editing of final product:** All group members

**Pecha Kucha:** All group members will have a part in either the preparation and/or presentation of material

## Budget

A funding proposal has been submitted to DSUSO requesting \$130 to purchase food incentives for survey participants, as well as to cover questionnaire printing costs (See Appendix H). No additional costs have been identified.

## Deliverables & Communication Plan

This project seeks to provide DSUSO with an in-depth report to further their goal of incorporating edible plants into the Studley campus landscape, in addition to promoting the goals set forth in the Dalhousie University Sustainability Plan outlined above (Background & Rationale).

The project will be communicated and delivered in two ways: a written report and a Pecha Kucha presentation. The Pecha Kucha presentation will be delivered on the evening of Tuesday, April 2nd, 2013 at the Company House on Gottingen Street. The presentation will be delivered as a PowerPoint, with twenty slides containing photographs, maps, and other supporting graphic materials, with the intent of promoting catalytic validity for the Edible Campus. The slides will be supported by an oral presentation highlighting our research. The written report, complete with supporting maps, case studies, and data analysis will be delivered via e-mail to the Campus as a Living Laboratory Blackboard Learn page on Friday, April 12th, 2013. A copy of the report, as well as our map files (both .mxd and .jpg formats) will also be delivered to the Dalhousie Student Union Sustainability Office (DSUSO) via e-mail on the same day, as per their request.

