

**Practicing Urban Agriculture On Campus: Integrating the LFS Garden with the Faculty of
Land and Food Systems Community**

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Faculty of Land and Food Systems
Grounded in Science | Global in Scope

UBC Food System Project (UBCFSP) VI
AGSC 450: Winter 2008

Scenario 5

**Practicing Urban Agriculture On Campus: Integrating the LFS
Garden with the Faculty of Land and Food Systems
Community**

Group 4

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TABLE OF CONTENTS

Abstract.....2

Introduction.....2

Vision & Value Statement 4

Methodology.....5

Discussion and Findings.....5

 A. Schools.....5

 B. Education Opportunities concerning the LFS Garden.....6

 C. Community Collaboration via Personal Communication.....7

 D. Literature Findings.....13

 E. Soil Analysis.....16

Recommendations

 A. Signage and Communication 17

 B. Garden Management.....18

 C. Garden Layout.....18

 D. Composting.....21

 E. Production, Harvesting and Distribution.....22

 F. Budget and Supply List.....23

 G. Education Opportunities.....25

Conclusion26

References28

Appendix29

Abstract

The University of British Columbia Food System Project (UBCFSP) is an ongoing collaborative effort between AGSC 450 students, project collaborators and partners to build a more sustainable food system at UBC. The focus of scenario five was to expand the LFS Garden to the west side of the MacMillan building. The expansion was purposed to further enhance small scale organic production; provide food in the LFS community; and provide opportunities for hands on interdisciplinary learning.

The group reviewed literature of previous AGSC 450 reports and communicated with project stakeholders, including Martin Hilmer, Jeff Nulty, Megan Halstead, Pearl Yip, Sophia Bake-French, Nick Gallant, Dr. Art Bomke, and Dr. Gwen Chapman. Through consultations, the group devised a business proposal that would be helpful for the development of LFS Garden which focused on: signage and communication; garden management; garden layout; composting; production, harvesting and distribution plan; budget and supply list; and education opportunities. The group also found that the LFS Garden had a potential to be implemented into education such as in Agroecology courses. In addition, the group has created garden management committed which includes Art Bomke, Martin Hilmer and Liska Richer. For the garden manager, all scenario 5 groups agreed to formulate an email that was sent out to all students in the faculty to attract students to the position. Furthermore, the group designed the garden layout that followed the concerns of community stakeholders, while utilizing creativity and imagination to create a garden that is a beautiful social space that is also sustainable. The project concludes with prioritizing the next steps towards implementation of the proposals.

Introduction

Food, land, and water—all equally important for our species survival; yet at risk for further contamination and degradation if humans continue to mass produce monocultured products through modern agricultural practices.

Raising food in a domesticated sense has historical roots dating back over 9000 years ago (Balter, 1998). Before the Industrial revolution urban populations mostly grew food within the city limits

where it was accessible to the markets. During the industrial revolution and with the invention of the fridge, transportation advancements, and increasing pollution there was a switch in the trend—with most food being grown out of the city limits. It hasn't been until recently, in the 1970s that people began to re-discover urban agriculture as an effective method of food production. (Halweil & Nierenberg, 2007)

The 'boom' in urban agriculture has been due to many reasons; environmental, economic, and psychological. With an increase in trade amongst countries, much of our food supply is from overseas—both expensive and environmentally inappropriate. Farming within a city, or small gardens, helps to decrease food costs, make food more accessible, and allows people to enjoy learning about agriculture and eat fresh, wholesome produce.

Most recently, much of the population has been concerned with the effects of global warming. In all stages of the food system, from production to consumption, huge quantities of fuel is needed, thus contributing to climate change. The distance our food has traveled, food miles, has been increasing; leading to further carbon emissions, thus environmental degradation. A relatively simple, and logistic way to fight global warming is to produce food closer to where it is being consumed, thus decreasing food miles. (Bentley & Barker, 2005).

There have been various post secondary institutes across North America that have invested time and resources into developing on-campus gardens. Currently, at UBC there are various agriculture sites, including on-campus community gardens; the newest site being outside the south entrance of the MacMillan building. This garden was established in 2007, where limited crops have been sporadically grown and utilized by on campus groups such as the Agora Café (Steedman, 2007).

To reduce our carbon footprint, be a model for urban agriculture, and to educate people about urban agriculture our group, along with collaboration of many other Agriculture Sciences 450 students, faculty and UBC partners are developing a small-scale garden for the UBC community to utilize.

The goals of the project are “to create a demonstration site of small-scale local organic food production that can serve as an educational resource for teaching and learning among faculty, staff and students. To provide food that can be used in the LFS community, and to enhance the UBC Point Grey campus contribution to sustainable local urban food systems.” (Rojas, 2008, p.15) This garden will be an ongoing project for students and faculty to enjoy for years to come.

Vision & Value Statement

Collaboratively it was decided that education is the sole most important principal that was to guide our decisions. Education is fundamental when trying to make any sort of change. Since the garden will serve as a model for urban agriculture—it is concurrently serving as an educational tool for our campus or anyone who takes notice. The garden is symbolic for the theory that small changes can have large overall effects. If everyone grew a small amount of produce—then there could be a huge environmental impact overall.

Teamwork and community were other important principals that determined how we would design the garden and overall project. Living in Vancouver one can get lost in the crowd and feel anonymous—by setting up a place for students and faculty to partake in group activities, the garden will allow the faculty of Land and Food Systems to have a sense of community. School and studying can become stressors, and it is easy to shut others’ out while studying—the garden will help students relax and socialize when on campus. Our emphasis on the value of community is also evident in the way we conducted research by prioritizing the concerns of community stakeholders in our recommendations.

It has been noted and suggested numerous times throughout the semester on how important eating local, organically produced food is. Through this, it only makes sense that local food production will also guide our project. Local produce not only helps ones’ own economy, but is an environmentally friendly way to produce and consume—the food travels less, thus contributes less to global warming.

The garden's produce will be utilized by on-campus groups—transported without the use of automobiles. The campus garden is in its purest form— consuming the produce practically on site.

Methodology

Data was collected primarily through first person interviews via email, phone and personal communication; all participants were given letters of intent and consent forms (See Appendix). Other methods used to gather information for the garden included resource materials such as seed catalogues and gardening books, which further supplemented the first person interactions.

This project was completed through many collaborations with other Agricultural Sciences students working on the same scenario project. By working as a team we were able to respectfully and efficiently gather information from community stakeholders, without taking up too much of their time. The scenario groups also collaborated to overcome many bureaucratic obstacles, and brainstorm ideas for the best outcomes.

This project was community based action research at its purest. We were utilizing the knowledge that the UBC community had, while giving back to UBC through structuring a garden. Community based action research is beneficial to everyone who partakes in the experience—it is real, and makes learning applicable.

Findings & Discussion

A. Schools

It was found that various other post-secondary institutions have also included gardens on their campuses. The student garden at Milwaukee's University of Wisconsin contributes to environmental and natural science classes. These gardens help to beautify the appearance of campus and the surrounding neighbourhood. They sell their produce, as well as value added products for funds to maintain the garden. They have also acquired funding through rental garden plots. The long term goal

for the Milwaukee garden is to provide low-income families with products at a relatively low cost (Mikolajewski, 2002).

Stanford University has a one-acre farm that includes a large fruit orchard. It features many communally-managed student plots, as well as individual plots that are maintained by the farm's various members. They grow produce and flowers. Community workshops on organic gardening and farming are offered throughout the year, and they also donate their produce to various organizations. They provide their produce to campus food service, self-ops and co-ops with the local vendor of fresh, organic produce. Students involved in farming get credits as a part of a complete liberal arts education. Stanford's professors, staff and alumni are also taking part in maintaining these gardens. The student farmers are able to maintain their garden from the sale of produce, by offering class credits for labour, and from selling to student residence cafeterias. This garden serves as a multidisciplinary laboratory (Stanford, 2008).

University of Alberta's campus garden is filled with fruit trees and shrubs such as blackcurrants, apples, and Saskatoon berries, and at the garden entrance, a native plant area. The campus garden is managed by undergraduate students, graduate students, volunteers, and faculty. In addition, the university offers composting workshops. The garden is supported by Alberta Public Interest Research Group (APIRG), Student Extracurricular Activity Grant (SEA) which is allotted by the Dean of Students, and Edmonton Naturalization Group. They strongly believe in producing food organically. A goal of the university garden is provision of organic, fresh and nutritious food for students, the school's food bank, and the wider Edmonton community. Moreover, they would love to promote the cultivation of local, hardy and easily managed vegetables to the Edmonton community (ECOS, 2005).

B. Education Opportunities concerning the LFS Garden:

Incorporating the LFS Garden into current educational programs offered in the LFS faculty remains a major objective in the UBC Food System Project (UBCFSP). The garden presents a large

potential to educate students on the importance of local food systems and the methods of small-scale organic farming. By allowing students to grasp hands-on-experience within core courses, a higher level of education can easily be gained. Through the integration within the LFS curriculum, UBC can be seen as taking a ground breaking step towards sustainability and the promotion of local food systems, thereby acting as a model for other future campus gardens to come.

The feasibility in integrating the garden within the current LFS curriculum was addressed to the Associate Dean of LFS, Gwen Chapman. We outlined specific topics we wished to address, including the courses available outside of the directed studies course, AGRO 497 that could focus on garden management and/or planning, and the potential to exchange volunteer hours at the garden for course credits. With consent to use her thoughts and suggestions towards research, Gwen provided us valuable insights to make the garden education dream into a working reality. First, she mentioned that volunteer hours conducted at the garden in exchange for course credits would not be probable in the near future. For this to occur, this would require considerable amount of coordination between faculty and staff in order to fully establish a working procedure. Therefore, credit for volunteer hours should be considered in courses where volunteer hours are already mandatory, such as AGSC 100.

Secondly, integration should focus on pre-existing courses rather than the addition of a new course into the faculty due to course restrictions. Gwen stressed that targeting the Agroecology department would be the most suitable in order to achieve the necessary learning outcomes since Professor Andrew Riseman has recently raised concerns that there is a lack of hands-on-experience in the department. Courses she outlined that would be of particular interest within the agroecology department would be AGRO 490 (Topics in Agroecology), AGRO 497 (Directed Studies), and AGRO 461 (Applied Agroecology) and AGSC 496 (Career Development Internship) outside of the department. It should be noted that AGRO 497 can be conducted during the summer semester as long as there is consent given from the mentor. As an extension to a directed studies program, UBC also offers a student directed seminar where senior undergraduate students are able to both organize and facilitate a

course not currently offered by UBC with consent from a professor. This program is part of UBC's Learning Enhancement Academic Partnership (LEAP). Given this information, we can make valuable recommendations for the future.

C. Community Collaboration via Personal Communication

MARTIN HILMER, LFS Staff

A representative of each group in the same scenario project met with Martin Hilmer, a Land and Food Systems staff member, to discuss his potential participation on a garden management committee. Martin expressed his consent in becoming a committee member, but emphasized that it would be best if students managed the garden, with himself and Art Bomke filling in the gaps and providing support when needed. In Martin's opinion the garden should have two student managers throughout the summer session, and that these be paid positions if possible.

Martin identified the storage space under the west side exterior stairwell of Macmillan Building as a place to store tools and materials. The faculty can provide our group with some tools such as rakes and shovels, and requires that we create a supply list for other necessary items.

Martin's vision is for the garden to be a social space as much as a learning and production space. Since the University campus does not have a beautiful space on southwest side of campus, Martin believes the garden could serve this purpose, much like the Rose garden on the north side. Martin emphasized the need for clear boundaries for the garden, and suggested raised beds for plantings, with walkways and benches throughout. Benches could provide a fundraising opportunity, as people may be interested in donating money for a memorial plaque. Martin also suggested making this garden distinct from the UBC garden by including herbs and edible flowers, which are not sold at the UBC farm. Overall, Martin envisions this garden to be a "legacy", which students can contribute to, year after year (personal communication, March 10, 2008).

ART BOMKE, Associate Professor

Agroecology professor, Art Bomke, came to our class to discuss his vision and recommendations for the garden. Art sees the primary purpose of the garden as an educational opportunity for students. Being close in proximity to campus classes, the garden is a directly accessible production system for students to learn from. Art suggested, for example, that students could assess the nutrient profile of the garden to determine the health contribution of the garden's yield as an academic project. Plant propagation and compost monitoring are also potential educational activities.

While maintaining the existing south side garden is important, Art focused on the expansion of the garden to the west side of McMillan Building. In decades past this was the site of an apple orchard on campus. Art is excited about reclaiming that land for food production again. However, as is the nature of campus development, the future of that sight is uncertain. Art has obtained the go-ahead from Campus Planning for us to cultivate that land for the time being, but in the future the site may be used for a new building development. The garden should be connected to the UBC Farm Centre for Sustainability, but will be a food production model on a smaller scale, comparable to a chef's garden. In designing the site, Art recommended that it be both aesthetically pleasing, as well as suitable for educational use.

Art requested that we perform a soil assessment of the proposed site, and plant a test crop of potatoes to get the west side garden started. Art has obtained a donation of Potato crop from the Helmer's farm in Pemberton. In July and August planting can begin for items to be harvested in the fall for Agora. The difficulty with a project like this, Art noted, is how to keep the project alive as students graduate and leave campus. He recommended that the management committee have one faculty member and one staff member to provide some stability, since the involvement of students will be rotating. Art himself has committed to being on the committee to fill the faculty membership. (personal communication, February 6, 2008).

JEFF NULTY, LBS Landscape Architect

We met with Jeff Nulty, head of landscape design for Land and Building Services (LBS or Plant Ops). Jeff's first concern was the need for campus planning to be involved in the project. He expressed his willingness to be involved as a contact and resource person, particularly in the garden design.

Regarding the garden design, he explained that a clear boundary in a recta-linear shape is important to create a strong presence of ownership of the garden. To further define the space, an outside perimeter of at least six feet wide, room for a lawnmower, should be left. Within the garden itself, he mentioned that strong linear shapes are easier to maintain, and make a strong visual impact, showing ownership for the space. Furthermore, clear signage with contact information should be present so that passer-bys know whom to address with any of their questions or concerns.

While Land and Building Service will not be able to provide tools for building the garden, it may be able to provide and deliver wood chips or fine gravel for the use of building garden pathways. Woodchips are lightweight and can be packed densely to prevent weeds from growing, and are self-generated from plant clippings around campus, making them sustainable.

Unfortunately, due to budget limitations, Jeff was unable to secure funds to donate hedging material for the garden boundary. Fruit bushes were a suggested alternative, and Jeff proposed a simple wattle fence as an additional option. Plant Ops can provide soil from the south campus In-vessel compost, as well as help with disposal of surface materials such as scraped off sod by providing a drop-box on site. To organize this, Jeff recommended talking to Grazyna Rougeau.

Lastly, Jeff suggested some additional contacts. To obtain lumber for constructing raised beds, UBC Properties should be contacted, as they have donated lumber to UBC Botanical Gardens, from trees cut down in South Campus. It would be wise to contact CUPE 116, the union local for UBC's trades people, as they should be "kept in the loop regarding projects and work done on Campus by groups doing similar work to ensure work is not lost to outside contractors and other interest groups. They are quite amenable to cooperative, community projects such as this, but as a courtesy, they should be

advised to avoid any misunderstandings.” Their website with contact information can be found at <http://www.116.cupe.ca/>.

(personal communication, March 18, 2008).

SOPHIA BAKER-FRENCH, Agora Café General Manager

We contacted Sophia by email and met with her in person to discuss Agora’s produce needs, and her vision for Agora’s continued participation in the garden. Agora makes their first order in the third week of September, and orders weekly thereafter for the planned menu items. If it can be made known to Agora in advance what items will be available they can plan their menu around this knowledge. Agora places their orders on Fridays, and the orders are delivered on Mondays. Agora is able to store and freeze some processed/preserved items, though space is currently limited.

Items Agora would like to obtain from the garden are as follows:

- Tomatoes (30-50/week)
- Cucumbers (12/week)
- Lettuce (5 heads/week)
- Kale/Chard (2 bunches/week)
- Winter Squash (4 medium/ biweekly)
- Parsely, Rosemary, Sage, Thyme, Cilantro – small amounts at a time, as available by the supplier
- Other items that can be used for quishe, or newly proposed menu items will be considered

Agora has a total budget for food, but cannot determine how much the cafe can afford to purchase from the garden. Sophia recommends first determining what the garden would have to charge to cover its costs, and then consult with Agora. The Café will do its best to accommodate the garden, since the overall costs of running Agora are low. Sophia indicated that it is important to consider

whether the garden will charge for processing vegetables. Agora is entirely volunteer run, and operates at cost.

Agora's inventory manager would be the best liaison person between the garden and Agora. The volunteer in this position would likely attend a monthly meeting of the garden management committee. Sophia also offered to put out calls for garden volunteers through their list serve, as she recognized the difficulty in recruiting volunteers, especially during the summer. (personal communication, March 3, 2008).

PEARL YIP, AgUS President

Since the garden should have a committee that is in charge of maintenance and operations of the garden, we thought that an undergraduate LFS student could partake in the committee by creating a position in the Agricultural Undergraduate Society (AgUS). The current AgUS president, Pearl Yip, has approved that a garden liaison position could be created if there was an interest (personal communication, February 27, 2008). This liaison would be a great asset to the committee because that person could also be in charge of composting resources. For example, according to Pearl, the composting left over after a Wednesday night BBQ is put into the green bins, and used by UBC Waste Management (personal communication, February 27, 2008). Instead of Waste Management taking the leftovers, it could be used for the garden's personal composting system.

Having AgUS involved could help the garden out by incorporating the crops from the garden into the Wednesday night BBQs. For instance, garlic and onions are some examples of produce used in the BBQ (personal communication, February 27, 2008). Luckily, AgUS plans the BBQ meals two weeks in advance; thus, giving the garden time to grow and harvest the crops so that AgUS can receive the produce the day before the BBQ. If the produce is not ready for harvest, or has failed to grow by Tuesday, AgUS is pretty flexible, and is able to get the item from a different location (P. Yip, personal communication, February 27, 2008).

AMY FRYE, market coordinator of UBC farm

Amy came to our class to present the marketing experiences and challenges faced by the UBC farm. These challenges are likely to be shared by the garden, and we can, therefore, potentially learn from her insights. The majority of farm sales occur at the Saturday farm market (66% of sales), while only a small portion (19%) is through direct sales to restaurants and campus food outlets, and community supported agriculture (11% of sales). Ideally, sales would be equally split among the aforementioned avenues. Our scenario group was initially concerned that the garden might be in direct competition with the UBC farm. However, if the garden, as an extension of the farm, can meet some of the demands for farm produce, it would be a help rather than a hindrance.

Amy also presented some important marketing considerations for the garden management committee. Growing food on a non-industrial scale means that yield is limited and can be unpredictable. Consequently, it is difficult to guarantee your customers availability of specific crops. Additionally, pricing is an important consideration because while meeting operation costs, the price must be appealing to your customer. Scheduling and organizing deliveries is also an important consideration, as is quality and packaging (personal communication, March 12, 2008).

MEGAN HALSTEAD, Secretary of Friends of the Farm

Group one, in our scenario group, contacted Megan, secretary of Friends of the Farm, to gain some input into the volunteer aspect of managing the garden. Friends of the Farm were involved in the planting and maintenance of the south side garden. Their original plan was to administrate the garden through their club, and use volunteers from Agora, AgUS, and the AGSC 100 class for work parties.

Friends of the Farm's original vision for the garden was as a stepping-stone to the UBC farm. They hoped to attract interest in food gardens, and in turn, draw more people to the farm. However, they are concerned that the garden may be seen by UBC administration as a replacement for the farm.

Megan suggests keeping the focus on the garden as a small scale food production, different from the farm. The Friends of the Farm's main mandate is the farm, so a separate administration for the garden, as it expands, is recommended (personal communication, March 5, 2008).

NICK GALLANT, waste management

Using recycled compost as fertilizer is more sustainable than buying the fertilizer; furthermore, since the garden has a small budget, buying fertilizer would be an expensive commodity for the garden. According to Nick Gallant of UBC Waste Management, it is probably best if the garden had their own composting system (Personal communication. March 6, 2008). For example, the black composting bins could be used for the garden to compost produce and leaves (for bulk); also, windrow composting methods would be another asset to the system because it helps aerate and ensures that aerobic composting, rather than anaerobic, is occurring (N. Gallant. Personal communication. March 6, 2008). Fortunately, the garden would be able to have its' own composting system if it followed some rules and regulations. For instance, the compost should not attract rodents, which could easily be done if dairy and protein sources (bones, meat scrape, etc) are not incorporated into the black bins (personal communication. March 6, 2008). Also, the system cannot produce unnecessary gas, and/or foul odor (personal communication. March 6, 2008).

D. Literature Findings

Because we are what one might call "beginner gardeners" we chose to consult some of the gardening literature for design and planting advice, specific to the Northwest Coast. There are many methods and techniques to growing vegetables, each with their own unique benefits and challenges. In a wet cool region such as Vancouver, the "raised-bed" method is recommended for vegetable gardening. Raised beds help the soil to drain properly, as well as warm up faster in the sun. These beds can be as long as one likes, but should only be about four feet wide, so one can reach across without

stepping into the bed (Severn, 1978). However, several rows can be planted in the four feet wide space; therefore, this method saves more space for planting, than individual rows. Rectangular shapes are also easier to maintain and care for than odd shaped beds (Kourick, 1986). Manure and compost are dug into the beds, thus creating raised raising the soil approximately eight inches. It is recommended to dig a small trench around the beds to catch excess water (Severn, 1978).

Pathways between the beds should be approximately three feet wide, such that a wheelbarrow can pass through the space. These can be built out of a variety of materials, some more permanent, such as brick, and some more flexible, such as mulch. Those that are flexible, are generally also more low cost, but can be more maintenance as weeds can penetrate through the pathways. Laying strips of scrap carpet or cardboard underneath wood chips is a good idea to prevent weeds from growing up, and is also an easily sourced, recycled option. Straight lines use less materials and are more efficient. Usually the best path is the most direct, and should follow the natural flow of the space. "The existing muddy path is probably the best route" (Kourick, 1986, p.50). In all aspects of the design, function should take top priority.

When designing the garden, and determining the placing of plants, there are many factors to consider, from soil, to sun, to plant companions. For the most part, it is important to keep plants with similar needs together (Kourick, 1986). For example, plants that thrive in acidic soil, such as potatoes, strawberries and blueberries should be placed in the same patch of garden (Severn, 1986). Perennials and annuals should be located in separate beds, and fruit trees should be distanced from vegetable crops so that the tree roots do not interfere with the vegetables (Kourick, 1986). However, some times contrasting needs can create mutually beneficial conditions. For example, tall plants such as corn, beans and peas, can be utilized to create shade for cool-weather crops like lettuce and radishes. Another example is the planting of strong-scented plants like mint and garlic interspersed throughout the garden to repel pests such as cabbage moths, and dill next to tomatoes to repel tomato worm (Severn, 1986). Herbs, as well as flowers, also attract beneficial insects to the garden. It is not recommended to plant

them directly in the vegetable beds, but planted several feet away they will have a positive influence (Kourick, 1986).

The garden design should include seating such as benches so that the gardener(s) can make regular observations about the progress and health of the garden. It is important to keep a log or journal of what is planted, where and when, the date of maturity, crop yield, weather and other observations one may notice (Severn, 1978). This is useful to learn and adjust plans in the following year. In particular, it is important to keep track so that crops can be properly rotated. As a general guideline, “the same plant should not be grown in the same spot more than once every third year”, so that the soil is not depleted of nutrients used by a specific plant (Severn, 1978, p.55). “Root crops should be followed by leafy ones, and heavy-fruited vegetables such as squash should be followed by lighter, less demanding plants” (Severn, 1978, p.55). Cover crops, such as legumes, should be planted after the fall harvest, to add nitrogen to the soil over the winter, and then ploughed under in the spring (Severn, 1978).

When to plant is also an important and somewhat complex consideration. In the Pacific Northwest there are approximately 200 frost free days, and precipitation is usually abundant but variable. The last frost occurs between April and mid-May; therefore frost-hardy vegetables, such as spinach, cabbage, carrots, and onions, can be planted earlier, in March, but when the soil is no longer wet and soggy. After the frost danger, corn, tomatoes, squash, peppers, and beans can be planted. Successive crops can be planted into the summer, with frost hardy vegetables planted in June or July, to be harvested into the fall, and kept for winter (Severn, 1978). Keeping a journal will help these decisions become easier, year after year.

Before planting, however, it is essential to prepare the soil. New land in particular requires special preparation. The ideal soil condition is silt, which is dark, fertile and very rich in organic matter, or humus. Commonly, though, soil can be sandy, which has little nutrients and dries out easily, or clay, which is dense and hard so that it does not drain well and can be too acidic. “The optimum soil for vegetables should be rich in organic matter, supply plenty of nitrogen, phosphorous, potassium, and

trace elements. It should be only slightly acid and should be porous enough for air and water to move freely through it" (Severn, 1978, p.22). To achieve such ideal soil conditions, a variety of nutrients and trace elements should be added. Non-synthetic sources of nitrogen, phosphorous and potassium include bone meal, animal manure, and liquid fish fertilizer. It is important that a combination of these nutrients is present in the soil as they work together to make plants grow, and resist disease. On the coast, many gardeners add seaweed to the garden to provide essential trace elements (Severn, 1978). Garden clippings, weeds, and food waste can be easily composted, to reduce waste, and recycle nutrients back into the land.

E. Soil Analysis

When planning to build and grow a garden in an urban site, such as the LFS garden on UBC campus, the unique characteristics of the urban soil must be considered. Soil characteristics include both the observations of constituents and particles that make up the soil, and an analysis of the soil's nutrients. In collaboration with other Senario 5 groups, and with the help of Art Bomke, the characteristics of the soil of the LFS Garden were determined, and suggestions for the use of additions, such as fertilizers, were made.

The site of the proposed LFS Garden contains a mixture of soil types; the *native* soil, which is made up of sand, silt, clay, gravel, and rocks and houses earthworms; and the *non-native* soil, comprised of sand, pebbles, compost, and woody particles. The non-native soil is constructed from mixing yard trimmings compost and sand, while the native soil is similar to *Bose* soil, sharing similar soil characteristics of those in Surrey and Tsawwassen of the Lower Mainland.

The area of the proposed LFS Garden consists of soil types as follows: a section from which two portable units were removed contains mostly non-native or constructed soil; the bottom of the slope closest to the lot reaches approximately 15 cm deep and contains much of the soil particles washed down from the top, as well as black soil; and the top of the slope closest to the MacMillian building

reaching 35-40 cm deep contains more sand and pebbles. These different areas will become a factor in planning where certain crops are to be planted in the garden.

A look at the nutrient analysis of the soil as a whole indicates several clues to managing the garden. First, both the salinity and the level of organic matter (at roughly 10% for both native and non-native soils) appear normal, and as expected. Low levels of potassium, magnesium, and nitrogen were found in the soil sample, particularly for native soil (See Appendix A for lab results). In this case, mineral replacement and fertilization are viable options. To restore potassium and magnesium levels, *langbeinite* or Sulf-Po-Mag can be applied before the garden is plowed. For nitrogen, fish fertilizers have been proposed as an option for longer term use and can be used after plowing. Another long-term management strategy is the application of dolomite lime, particularly for native soils. (A. Bomke, personal communication, Feb 29, 2008).

Recommendations

A. Signage and Communication

Stewardship and education are significant goals of this project. In order to communicate the project's objectives and request the respect of passer-bys, signage is a mandatory first step in designing the garden. As a scenario group we decided on naming the expanded site "The LFS Orchard Garden" to give recognition to the land's past as a food production site. We want this garden to be a legacy for years to come, and this name reflects the idea of continuation. Currently, the expanded site has been marked with a temporary sign, featuring a design created by collaboration of the four groups in the scenario (see group 17 for the design image). We recommend this design be utilized for a larger, more permanent sign. Furthermore, we recommend that as students begin various educational projects within the garden, they mark their space with a sign, indicating the goals of their project.

In addition to physical signage, our group also recommends that future student managers create a blog, as a public forum for the garden. In this blog, we recommend detailing experiences with

bureaucracy and administration, challenges of garden management, success and failures of crops, including photographs, and personal experiences of student researchers and volunteers. We envision the bog as an effective and up-to-date tool for creating discussion about urban agriculture, and a resource for other campuses and communities who are hoping to start their own garden.

B. Garden Management

Lin Steedman, the student involved in the creation of the initial South side garden, envisioned the creation of a committee to take up the management of the garden, and form a student group to working in and running the garden and its expansion (Steedman, 2007). The main duty of the management committee is to ensure the smooth operation of the garden in order to fulfill the education and production objectives of the garden project. This will involve choosing the best proposal for the west side expansion, organizing work parties to implement the proposals and continuously care for the crops and garden site, take over the management of funds from Friends of the Farm, liaise with Agora and AgUS to deliver food to their operations, and continue to collaborate with community stakeholders for their ongoing input and recommendations. The committee should consist of one faculty member, one staff member, two student managers, and representatives of the different stakeholders. We have created a committee which thus far includes Art Bomke (LFS Professor), Martin Hilmer (LFS Staff member), and Liska Richer (phD Candidate)(personal communication, March 31, 2008). The undergraduate student position has not yet been filled. As a scenario group, we have formulated an email that was sent out to all the students in the faculty, to attract students to this position. We envision such person(s) to be the primary manager(s) of the garden, with Art, Liska, and Martin as mentors, who will provide help and support when needed. Additionally Agora and AgUS have each agreed to have a representative attend meetings to facilitate communication between the food outlets and the garden committee. Jeff Nulty, landscape architect of Plant Ops, has agreed to continued participation, and

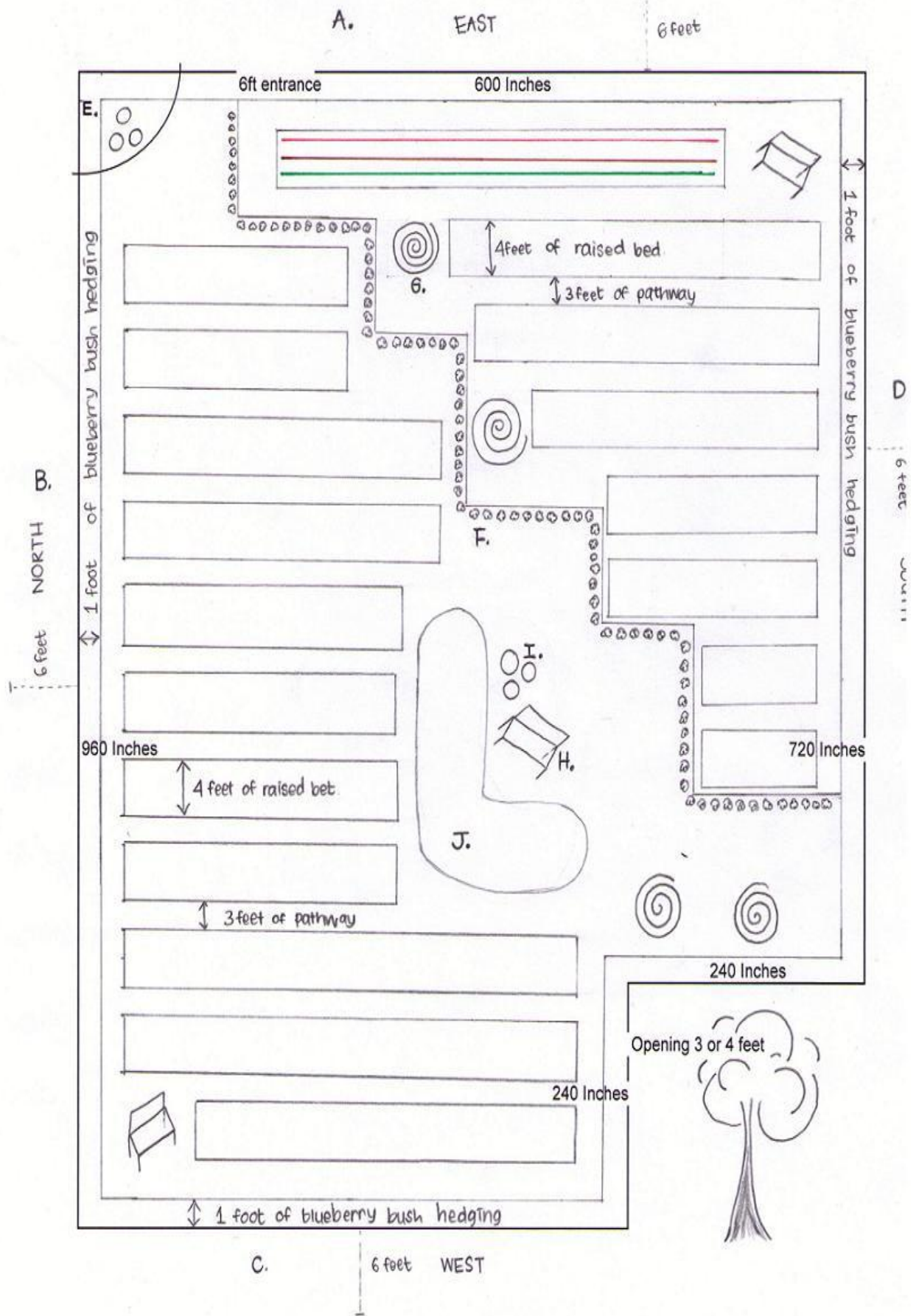
attend meetings to provide input on garden design and maintenance. (The appropriate contact information of the committee members can be found in Appendix B). We recommend that Liska arrange the first meeting at the end of April, since she will have direct access to the four different proposals for this scenario, and can, therefore, best determine what the appropriate next step will be.

C. Garden Layout

Our layout proposal for the expansion of the garden to the west side of Macmillan building reflects the central goals of this project: community collaboration, education, and sustainability. The input of community stakeholders, such as the recommendations from Jeff Nulty of Plant Ops, takes precedence in our design. We have left a six-foot perimeter along all sides, for easy mowing, and the linear layout achieves the ordered appearance he emphasized. The benches throughout create the relaxing and inviting social space that Martin Hilmer envisioned. The low maintenance raised beds and wood chip pathway will be easier to care for by a rotating student membership. The raised beds also easily provide designated separate sites for various student projects, so that experiments can occur without disturbing the rest of the garden production. We envisioned the space to be flexible, so that as students learn from past successes and failures, the garden can evolve with those lessons. Functionality took priority in our design. We placed the compost closest to Agora, so that food wastes can be utilized in the garden, and we chose a simple, yet effective layout, so that different, rotating, student managers can easily maintain records, and transitions flow smoothly. Furthermore, the simple design does not require any expensive construction and materials can be sourced through scrounging or donations, such that the garden is economically sustainable as well as socially and environmentally. We hope that as years go by, community collaborators can continue to provide their input to improve the garden's design. In the meantime, the creation of a border, either a simple but sturdy fence or blueberry bushes, should be established around the existing south side garden. Please see the following page for the proposed design.

Legend- Figure on next page:

- A. McMillan Building, East Side – Upslope – morning sun
- B. Annex side, North side – potential shade created; tall plants and shade tolerant plants
- C. Park lot, West side – Down slope – wetter conditions
- D. South side – sunny – sun-loving plants
- E. Compost
- F. Main pathway complete with flowers
- G. Herb spiral- dry-condition herbs at top, moisture needy herbs towards bottom
- H. Bench
- I. Flower pots
- J. Flowers



Composting

Since Agora and AgUS are major food providers for the LFS community, they accumulate large amounts of waste and composting materials. Fortunately, the recyclable compost material is contributed to UBC Waste Management's composting system, which is in shortage of compost materials (N. Gallant. Personal communication. March 6, 2008). Even though it's unfortunate that UBC Waste Management is in short of compost, we recommend that the waste produced from Agora and AgUS should contribute to the LFS community garden because the fertilizer produced from the compost will help with plant growth. Thus, it will increase rates of usable produce that can be incorporated into Agora and AgUS food supply. This cycle of recycling composted foods to produce new product would decrease the ecological footprint of the LFS community. Furthermore, a compost site at the garden will also create educational opportunities for research in soil management. Therefore, we recommend that the garden should have its' own composting system where the majority of the materials come from Agora and AgUS.

The garden's composting system should follow the bin method because it is not labour intensive, and it only entails a composting bin, which can be purchased at any gardening stores at a reasonable price. With the bin method, in order to get good quality fertilizer the compost mixture should follow a carbon-nitrogen ratio of 30:1, include only composting materials, aerated once a week, and contain some moisture (FAO, 2007).

In order to get a 30:1 ratio, mix equal amounts of green materials¹ (high nitrogen sources) and brown materials (high carbon sources) (GVRD, 2004). If the ratio does not equal to that amount, an unwanted aroma would linger (FAO, 2007). This is caused by a loss of nitrogen due to the materials decomposing at a rapid rate (FAO, 2007). If this occurs, then high nitrogen materials can be added to the bin to decrease the smell of ammonium, and loss of nitrogen (FAO, 2007).

Once the material is set in the composting bin and the ratio is managed, all that is left to do is aerate the material once a week. This can be done by mixing the mulch with a large poking stick to allow oxygen flow throughout the bin (GVRD, 2004). This will prevent anaerobic compost, which produces unwanted gases and odors (FAO, 2007). Also, moisture control should be monitored. At least half of the materials in the compost bin should be moist. Too much moisture can cause unwanted smells, and will decompose at a slow rate (FAO, 2007). On the other hand, if the material is too dry then the material will decompose at an even slower rate (FAO, 2007). It usually takes 3-12 months to produce fertilizer from composting materials in ideal conditions (GVRD, 2004). Thus, once the garden is established the composting system should be started too in order to use the fertilizer right away.

D. Production, Harvesting and Distribution Plan

Based on the needs of Agora and AgUS, and the popularity of certain items at the UBC Farm, we recommend the following plan for crops, suitable to the Northwest coast climate and topography. Those crops that are harvested in summer, such as the potatoes, which we have already planted, can be sold at the UBC Farm Market, whereas Agora and AgUs can utilize those crops harvestable in the fall. Crops can be distributed to these outlets without the use of automated vehicles- wheelbarrows and volunteer labour will suffice. As the garden expands, and becomes a stable fixture, more crops can be added to the rotation. For the South side garden, we recommend maintaining the three-year crop plan proposed by Lin Steedman (2007). For everything that is ultimately planted, we suggest the management committee maintain a seed log (see Appendix C), recommended by the 2007 Agsc 350 students (Mou et al., 2007). The seed log can then be used in student-led research on the nutritional output of the garden.

Crop	Timing	Harvest	Distribution	Storing
Lettuce (leaf)	April August-September	June September-October	UBC Farm Agora, AGUS	Rapid cooling/use polyethylene head wraps/open topped bags

Peas	early March	July	UBC Farm	Frozen
Onions*	mid-late March August	October July ^a	AGORA, AGUS UBC Farm	Store in a cool, dark, dry location and spread out for optimum air circulation
Spinach	mid-late March July	May September	UBC Farm AGORA, AGUS	Frozen
Carrots	April mid-July	July November	UBC Farm AGUS, AGORA, UBC Farm	Can be stored in a pit, storage cellar or covered row
Bush Beans	May June	June-July July-August	UBC Farm UBC Farm	1. Refrigerate without washing 2. Frozen
Pole Beans	May	July	UBC Farm	Refrigerate without washing
Cucumber	May	August	AGORA, AGUS	Refrigerate without washing
Tomato	May	August	AGORA, AGUS	Refrigerate without washing
Brussels sprouts	early June	October	AGORA, AGUS	Rinse and dry first, place and seal in a plastic bag in a refrigerator
Zucchini	late May/early June	August	AGORA, AGUS	1. Store in a plastic bag , without washing in the refrigerator 2. Frozen

* Overwintering onions

^a2009

E. Budget & Supply List

Below is a list of supplies required for the garden, and the expected costs. Most items can be sourced through donations and recycling, representing the low end of the budget, but if not, these items will have to be purchased, representing the high end. The garden currently has \$500, held in the Friends

of the Farm account. However, we recommend that the management committee use the recommendations from our scenario projects to apply for further funding. The garden scenario group, as a whole, have taken the initiative to apply for the 2008 AMS Grad Class Council Gift to obtain funding for the garden, and a student manager salary.

**Projected Start-Up Budget Plan and Supply List for LFS Garden
Year 2008-2009**

	Low - End*	High - End*
Sources of Capital		
Crop/Product		
Sales☼		
Agora	\$0.00	\$0.00
AGUS	\$0.00	\$0.00
Total Crop/Product Sales	\$0.00	\$0.00
Subsidies and Grants		
Victor Runeckles Grant	\$500.00	\$500.00
Total Subsidies and Grants	\$500.00	\$500.00
Other Income	\$0.00	\$0.00
Total Income (\$)	\$500.00	\$500.00
Start-Up Expenses		
Production Expenses		
Fertilizer/Seed		
<i>Crops/Produce</i>		
Winter Squash	500g: \$130.10	500g: \$130.10
Tomatoes	400g: \$69.95	400g: \$69.95
Lettuce	100g: \$29.95	100g: \$29.95
Cucumbers	100g: \$41.50	100g: \$41.50
Onions	500g: \$84.49	500g: \$84.49
<i>Herbs</i>		
Cilantro (56 seeds/g)	4g: \$4.05	4g: \$4.05
Sage (80 seeds/g)	0.5g: \$2.70	0.5g: \$2.70
Thyme (2400 seeds/g)	0.1g: \$2.70	0.1g: \$2.70
Rosemary (800 seeds/g)	0.1g: \$2.80	0.1g: \$2.80
Total Production Expenses (\$)	\$368.24	\$368.24
Other Expenses		
Small Tools/Supplies		
Shovels **	\$0.00	\$0.00
Composting Bin*	\$59.00	\$59.99
Rakes **	\$0.00	\$0.00
Wheelbarrow*	\$44.99	\$49.99
Garden Hose	\$7.99	\$32.50
Watering Can	\$12.99	\$32.50
Garden Tiller*	\$29.99	\$29.99
Garden Pruner	\$3.99	\$8.50

Compost and Mulch Fork	\$29.99	\$62.00
Tomato Trellis [♦]	\$11.50	\$72.50
Weeder	\$5.99	\$16.95
Compost/Fertilizer [◇]	\$0.00	\$0.00
Hard Landscape		
Pathway Construction		
Wood [♣]	\$0.00	\$0.00
Woodchips [♣]	\$0.00	\$0.00
Wages		
▲	\$0.00	\$0.00
Total Other Expenses (\$)	\$206.43	\$364.92
Net Garden Income (\$)	(\$74.67)	(\$233.16)

- Low-end and high-end budgets are calculated based on quality of tools and supplies required to operate at the perceived level of production. Low-end prices obtained from Canadian Tire, and High-end prices obtained from Lee Valley, unless otherwise specified.
- ** Available from Martin Hilmer, LFS Staff
- ● Prices obtained from Canadian Tire
- ◆ Prices obtained from Lee Valley
- ♣ Free from the Parks Board/ or UBC Plant Ops
- ◇ Supplied by donation from UBC Farm
- ▲ Wages for volunteer labour will initially be zero at start-up; may increase to \$2,240 for a paid Garden Manager position based on \$14/hr, 10hr work week from May-August
- ♠ Wood used for the construction of raised beds is provided by Parks Board
- ☼ Crop sales will initially be zero at start-up

F. Education Opportunities

The LFS Agroecology department should be targeted for garden educational opportunities. As Associate Dean of LFS, Gwen Chapman mentioned in our interview, there is a strong potential for the garden to be implemented into education with the appropriate learning outcomes if aimed towards the already existing Agroecology courses offered. Such courses include, but are not limited to AGRO 490 (Topics in Agroecology), AGRO 461 (Applied Agroecology), and AGRO 497 (Directed Studies). Professors could take advantage of the garden by implementing a hands-on technique towards the study of a variety of areas including soil sciences, pest management, and horticulture. As part of conducting preliminary research on professors interested in the garden's integration into the course, our group collaborated with other AGSC 450 groups performing the same scenario, and sent out an email to the LFS faculty members. The email addressed the objectives for the expansion of the LFS Community Garden and its need to be integrated into education. Future students should contact the professors

who exhibit interest and think critically in the application of the garden in education by establishing a course syllabus and a description of projects or assignments regarding the garden.

Outside of the Agroecology department, there are few courses in which the garden could be effectively applied as an educational tool. A requirement of AGSC 100 a specific number of on-campus volunteer hours. The garden would be a good way to incorporate the necessary volunteer hours in the students' requirements. It would also increase the garden's exposure to younger undergrad students thereby hopefully establishing a returning and committed team of volunteers over the course of their UBC career. AGSC 496 would also be a potential course to implement a garden project. This course is a career development internship, so the student would be working closely with a mentor. As an intern with the LFS Community Garden, the individual could potentially work closely under the Garden Management team and explore the importance of local food systems and small-scale organic horticulture.

One of the largest obstacles that the LFS Garden faces is maintaining a continual and committed team of volunteers. Incentives must therefore be offered in return for volunteer hours. In collaboration with other groups, a mass email regarding the volunteer opening for Garden Manager was sent to the entire LFS undergrad society. It was outlined in the email that depending on the quality of work achieved, the position may become a paid-volunteer position, where no less than \$14/hour would be given (See appendix). This amount is the established minimum because we feel that it is important to pay no less than the work-study wages offered by UBC in order to attract quality workers and therefore a team devoted to the well-being of the LFS Community Garden. It is therefore recommended that future students adjust the wages and job description of the Garden Manager accordingly based on the garden budget and capabilities of the individual hired.

Conclusion

Working on this scenario project in collaboration with three other AGSC 450 groups proved to be a good experience in collaboration; however the need for effective and clear communication was apparent through the challenges we faced as a large group. In order for the garden to take shape, upon reviewing the proposals, it is imperative to find a smaller, but equally dedicated group of students to take on the implementation and stewardship of the LFS Orchard Garden. Furthermore, it should be a priority for the management committee and student group to maintain the community relationships that developed out of this process. Successful collaborations of this sort take time to mature and become meaningful, so dedication to community-based action research is a must. We hope that the garden can be a true model of a successful urban agriculture initiative, from which other campuses and communities can learn.

References

- Balter, M. (1998). "The First cities: why settle down? The mystery of communities." *Science* 20, 282, 1442. Retrieved March 1, 2008 from <http://www.sciencemag.org/cgi/content/full/282/5393/1442>.
- Bentley, S., & Barker, R. (2005). "Fighting global warming at the farmer's market: The role of local food systems in reducing greenhouse gas emissions." In *A FoodShare Research in Action Report* (pp.1-14). Toronto: FoodShare. Retrieved September 5, 2007 from <http://www.organicconsumers.org/environment/ACF230.pdf>.
- Environmental Coordination Office for Students. (2005). *Campus Garden*. University of Alberta Students Union. Retrieved February 11, 2008 from <http://ecos.su.ualberta.ca/content/food.php>
- Food and Agriculture Organization of the United Nations. (2007). *On-Farm Composting Methods*. Retrieved on March 29, 2008 from http://www.fao.org/ORGANICAG/doc/On_farm_comp_methods.pdf
- Greater Vancouver Regional District. (2004). *Just the facts- Composting*. Retrieved March 29, 2008, from <http://www.gvrd.bc.ca/recycling-and-garbage/pdfs/facts-composting.pdf>
- Halweil, B. & Nierenberg, D. (2007). "Chapter 3: Farming the Cities." In *State of the world* (pp.48-65). New York: Norton & Company.
- Kourik, Robert. (1986). "Designing your edible landscape". In M. Kane (Ed.), *Designing and maintaining your edible landscape naturally* (pp.41-71). Santa Rosa: Metamorphic Press.
- Mikolajewski, M.B. (2002). *Milwaukee Community Gardens*. University of Wisconsin. Retrieved February 9, 2008 from <http://www.uwm.edu/SARUP/gallery/planning/planstudentpdf/milwaukeecommunitygardens.pdf>
- Mou, C., et al. (2007). *Community Gardens: A method for measuring food production and a look into increasing nutritional awareness and food security in Vancouver*. UBC. Retrieved January 23, 2008 from http://www.webct.ubc.ca:80/SCRIPT/agsc_450/scripts/serve_home
- Rojas, A. (2008). *The University of British Columbia Food System Project*. UBC. Retrieved January 23, 2008 from http://www.webct.ubc.ca:80/SCRIPT/agsc_450/scripts/serve_home.
- Severn, Jill. (1978). *Growing vegetables in the pacific northwest*. North Vancouver: Douglas & McIntyre Ltd.
- Stanford Community Farm (2008). *A community farm for Stanford*. Stanford University. Retrieved February 11, 2008 from <http://www.stanford.edu/group/scfarm/proposal.html>

Steedman, L. (2007). *Directed studies report: LFS (land and food systems) garden at Macmillan building*. UBC. Retrieved January 23, 2008 from http://www.webct.ubc.ca:80/SCRIPT/agsc_450/scripts/serve_home

Appendix

A. Soil Sampling Lab Results

PSAI

WBC

Rich Cheng
+ Art Banks

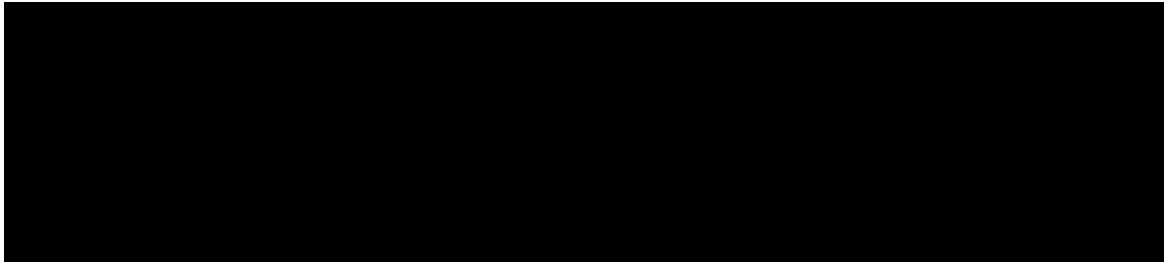
July 18/2008

SAMPLE	pH	Buffered pH	Dolomite lime to achieve pH 6.5 (lb./1000 ft ²)	$\frac{C}{N}$ Carbon Nitrogen Ratio	E.C. Salts (mmhos/cm)	O.M. Organic Matter (%)	N Total Nitrogen (%)	P Phosphorus	K Potassium	Ca Calcium	Mg Magnesium	Cu Copper	Zn Zinc	Fe Iron	Mn Manganese	B Boron	S Sulfate-Sulfur
<i>LEC Standards</i>																	
<i>NATIVE</i>	<i>5.8</i>		<i>50</i>	<i>17.1</i>	<i>0.36</i>	<i>10.1</i>	<i>0.33</i>	<i>49</i>	<i>75</i>	<i>700</i>	<i>80</i>	<i>31</i>	<i>12</i>	<i>30</i>	<i>23</i>		
<i>NON NATIVE</i>	<i>7.0</i>			<i>27.9</i>	<i>0.40</i>	<i>9.6</i>	<i>0.20</i>	<i>51</i>	<i>145</i>	<i>3000</i>	<i>155</i>	<i>3.2</i>	<i>13</i>	<i>110</i>	<i>67</i>		

COMMENTS:

#5 - 11720 Voyageur Way, Richmond, B.C. V6X 3G9 273-8226

B. Management Committee Contact Information



C. Seed Log Template

We have improved the food production log that has been created by AGSC 350 students of 2007. This log will help keep track of the garden’s production and the health and vitality of the plants. Garden members are required to record a number of aspects involved in their gardening: the number of seeds planted; the distance between each planted seed; the number of harvested plants; and the average weight of the harvest. This information will help garden managers to keep track of production and also reflect back on the past season, to inform planting decisions for the next season, avoiding wastes and learning from previous mistakes.

Location:

Date / Season	Weather / Air Temp.	Soil Temp.	Name of seeds	Quantity	Spacing	Date of Harvest	No. of produce

Legend:

1. Season Dates

- Spring: 21 March – 20 June
- Summer: 21 June – 22 September
- Fall: 23 September – 20 December
- Winter: 21 December – 20 March

2. Choose the Standardized Weather:

- Sunny
- Mainly cloudy
- Variable cloudiness
- Rain
- Light Rain
- Flurries • Snow

3. Air temperature reading has to be measured at the same location.

4. Use the same instrument at all times.

D. Consent Forms

Please see the attached forms (available in the hardcopy version only). These forms provide consent for information used by all groups in scenario 5, and therefore are not included in our group’s page limit.