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**Education Programs in the LFS Orchard Garden and Agora Café**

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**Scenario 4:**  
**Education Programs in the LFS Orchard Garden**  
**and Agora Café**

Land Food and Community III: LFS450

**Team 6**

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## **ABSTRACT**

The value of garden-based learning is undeniable in its capacity to revolutionize current paradigms towards ecological literacy for educating future generations. Perhaps the most significant connections created are the ones that instill a sense of place and understanding of nature and all living organisms. The UBCFSP is a community-based action program that consists of many partners and collaborators. Through a collaborative effort between the Faculty of Education, Faculty of Land and Food Systems, and our project stakeholders at the University of British Columbia (UBC), the establishment of an outdoor classroom has been initiated. This space is part of the LFS Orchard Garden at UBC and will be utilized to help educate teachers and equip them with relevant skills and information. Some of the barriers to participation included lack of knowledge, accessibility to resources, and teacher-confidence working in an outdoor environment. In response, our group created two workshops to facilitate, as well as a resource list that will ideally support teachers in implementing outdoor education. The feedback we received from our stakeholders indicated that our workshops were a good starting point for the program and could be further developed to include more material and connection to other workshops. Developing garden-classroom connections in outdoor learning spaces will help to encourage students to spend more time outside ultimately assisting in the development of children's sense of place in natural green spaces.

## **INTRODUCTION**

As part of the University of British Columbia (UBC) Food System Project, students in the Faculty of Land and Food Systems (LFS) participate in community-based learning centered on various aspects of the University's food system. This paper will focus on the

*Education Programs in the LFS Orchard Garden and the Agora Café* scenario as part of the capstone course in the LFS series. Our research team is comprised of six 4th-year LFS students from various academic backgrounds including Food, Nutrition and Health, Agroecology, Applied Biology, Food Science, and Nutritional Science programs at UBC.

### ***University of British Columbia Food System Project (UBCFSP)***

The UBCFSP is a community-base action program that consists of many partners and collaborators. The nine-year old program is a capstone course for approximately fifteen hundred students and ten generations of students from LFS and the Sauder School of Business have all taken part. The scenarios were developed in consultation with the project partners and collaborators and undergo revisions based on the feedback from LFS students participating in the Land Food and Community III (LFS450) course.

### ***Scenario Introduction***

Integration of core concepts in Food, Nutrition, and Health, Agroecology, and Global Resource Systems has been a primary focus for the Land, Food and Communities Series since its beginning. Also connected with the UBCFSP is the Think&EatGreen@School Project, which has similar intentions within the Vancouver School Board (VSB). Educational communities are becoming increasingly aware of the great potential for nutrition and environmental awareness education that is best provided by outdoor classrooms and school gardens.

Despite the importance of ecological and nutritional consciousness, kindergarten through to high school teachers have little to no experience with the practical application of school garden education. Through a collaborative effort between the Faculty of Education, Faculty of Land and Food Systems, and our project stakeholders, the

establishment of an outdoor classroom has been initiated. This space is part of the LFS Orchard Garden at UBC and will be utilized to help educate teachers and equip them with the relevant skills and information needed to become comfortable teaching garden-based lessons in an outdoor space.

In the preceding LFS series, students contributed to the vision and design process for this gardening space. The team was divided into separate groups to research the needs and interests of teachers and design requirements to accommodate the particular needs of current curricula. Once the outdoor learning space is completed the Think&EatGreen@School project leaders will be able to host the Summer Institute, a week-long teacher professional development program in collaboration with the Vancouver School Board and Faculty of Education at UBC. Through the Summer Institute, a series of garden-based learning workshops will be offered. These workshops are intended to provide teachers with the tools required to incorporate outdoor lessons into all aspects of the VSB curriculum.

### ***Importance of Garden-Based Education***

The value of garden-based learning is undeniable in its capacity to revolutionize current paradigms towards ecological literacy for educating future generations. Evidence has been well documented from various sources and recurrent themes have been established from a wealth of literature. Although a universal model for success in practicing garden-based education is neither available nor practical, the advantages in the outcomes related to education are parallel regardless of the approach or situation in which it is implemented. Contributions to ecological awareness, nutrition and health, academic performance, school environment and culture, development of individuals and

community linkages are just some of the commonly noted benefits of school gardening (Desmond *et al.*, 2004).

Perhaps the most significant connections created are the sense of understanding, and belongingness with nature and all living organisms (Raffan *et al.*, 2010). Also, students are exposed to the cycle of life and the relationship between modern actions and their extensive implications in the future (Desmond *et al.*, 2004). The importance of instilling these ideas in young children and centralizing its significance in modern education cannot be undervalued as humanity attempts to tackle the challenge of matching sustainable lifestyle choices with the carrying capacity of our planet.

Increased environmental consciousness as well as connecting people to the land promotes the realization of one's potential to contribute to the betterment of society through a connection with nature. This type of foundation is incredibly valuable when considering its collective impact on long-term personal, ecological, and thus societal success.

### ***Community & Stakeholders***

The stakeholders of this project are representatives, coordinators, and facilitators of the Think&EatGreen@School Project. The intention of this project is to look at innovative ways to reconnect society with the land and food that nourishes us by teaching students ecological literacy and its relevance to human health. This five-year interdisciplinary study will be encompassing the collaboration between the Faculty of Education and the Faculty of Land and Food Systems, including partnerships with the UBC Teaching Education program and the Summer Institute. The Summer Institute will be a weeklong program facilitated by the Think&EatGreen@School program that will introduce current teachers to ways of incorporating garden education into their daily

classroom activities. Our group worked closely with stakeholder contacts: Jay Baker-French, LFS Orchard Garden Manager, Julia Ostertag, PhD candidate, and Chessa Adsit-Morris, Master's student in the Faculty of Education.

### **Project Goals and Objectives**

Considering all aspects of the UBCFSP Vision Statement, our LFS 450 team collectively decided on a number of objectives and conceivable outcomes for this project. These objectives were derived upon the assumption that this project scenario will be a topic of continued development and research leading to the formal implementation of garden-based education into the Vancouver School System.

The objectives of our project were to: create two workshops that would provide teachers with the skills and information necessary to educate their students via garden-based learning; offer resources for information and networking opportunities that teachers can utilize in order to effectively engage their students in garden-based learning; equip teachers with methods and creative approaches associated with garden-based learning that will facilitate and encourage student participation in increasing ecological literacy and awareness in related themes such as nutrition, health, and respect for the environment. In achieving these objectives a dynamic foundation will be established for the long-term implementation of school gardens into educational systems.

The duration of this paper will discuss the ways in which our goals were attained, the barriers overcome in order to achieve project goals, as well as a detailed description of the results. Concluding thoughts and interpretation of our results, recommendations



for future action, and areas with opportunities for further research to complement our findings will be examined.

## **METHODS**

To meet the objectives of our project we incorporated several research methods including weekly group discussions and informal interviews with our stakeholders. As a team we developed a descriptive timeline to outline the tasks we planned to accomplish each week and used Google docs to document our progress. We generated a list of questions and met with Julia Ostertag and Chessa Adsit-Morris on February 23, 2011.

Along with the two other LFS450 teams also involved with our scenario, we conducted a sensory tour in the LFS Orchard Garden with our Teaching Assistant (TA) Will Valley on March 2, 2011. On our sensory tour of the LFS Orchard Garden we used our five senses (seeing, hearing, feeling, smelling, and tasting) to experience the environment around us. We smelled and touched the different plants growing in the garden and linked the smell of garlic and onions to children's memory association of events in their lives.

On March 16, 2011 our team observed established worm bins located outside the McMillan building at UBC, which are being maintained by Jay Baker-French. We described our workshops to our stakeholders on March 30, 2011 outside in the LFS Orchard garden space in order to obtain feedback on the outline and content of our frameworks for the workshops. This served as our project evaluation and we recorded the feedback in order to capture all of the suggestions given to us by our peers, stakeholders, and TA.

Throughout this project our group conducted an extensive review of primary and secondary literature on the topic of outdoor learning and school garden education. We focused on articles in the peer review journals that included these search terms: *sense of place, outdoor learning, gardening, and school garden education*. Additionally, our research also focused on the social, cultural, and historical aspects of the space where the workshops are to take place.

## **FINDINGS AND OUTCOMES**

During our first meeting our stakeholders provided a more detailed description of the project and clarified what their goals and expectations were. This enabled us to begin constructing our project and provided valuable insight for our focus. From this discussion the theme “sense of place” emerged and the interest in connecting cultural and social aspects of this concept to the outdoor learning space was established as a major finding. One suggestion was to carry out a sensory tour and spend some time in the LFS Orchard Garden to gain inspiration from the learning environment. The stakeholders suggested that we create activities within our workshops that link to the outdoor space. A particular recommendation was to research supplementary materials and interesting facts related to the topics of our workshops in order to engage the students and the teachers in outdoor learning.

Our group created two workshops, one on composting that focused on vermiculture, and the second on planting garlic. We developed one hour long frameworks for these workshops that included an introduction, goals, supplies needed, intended audience, subject curriculum, timeline, and additional resources (See Appendix A,B, and C). We also created handouts that would be given to the workshop participants

(See Appendix D, E, and F). These handouts provided a brief overview of the workshop material and additional information and resources related to the topic.

From our project evaluation we obtained feedback on our workshop frameworks, the supplemental handouts, and the delivery and execution of our workshop. This feedback was then used to re-evaluate the related areas and make any necessary changes.

### *Growing Garlic Workshop*

Primary suggestions proposed by our stakeholders to improve our garlic workshop were: researching the different species of garlic, creating a comprehensive map showing where garlic is grown in the world, placing more emphasis on visuals on the handout with the example of a braided garlic strand for the section on storage, and to encourage the use of all senses while demonstrating the workshop.

### *Composting: Vermiculture Workshop*

Primary suggestions proposed by our stakeholders to improve our composting workshop were: researching the different worm species and which ones are native or introduced to the area, the history of the earthworm and the story of colonialism, and how the current worm species affect forest ecology. The value of compost and “black gold” in terms of soil degradation and the loss of topsoil were also discussed. Language around the terms earth, dirt and soil in different cultures and the connection First Nations have with the salmon that essentially compost (decay) and then fertilize the forest were other ideas presented to discover “hooks” or deeper connections to the workshop topic.

## **DISCUSSION**

### ***Barriers to participation in school garden education***

Last year a team of LFS350 students conducted a series of personal interviews and administered on-line surveys to a group of teachers to determine what obstacles deterred them from integrating outdoor-based lesson plans into their class. They determined that the three main barriers to participation in outdoor education for teachers were weather, safety and concern for the students, and lack of knowledge and confidence working in an outdoor environment (LFS350 Report, 2010).

The first two barriers, weather and safety, can be overcome by taking these two factors into consideration and designing a space that is appropriate for outdoor education. One way to address the third barrier, lack of knowledge, is through hosting garden-based professional development workshops for teachers to obtain the background material they need to feel more comfortable teaching in an outdoor setting. Our workshops were designed so that they could be adapted to many grade levels and could easily be applied to many of the prescribed learning outcomes put forth by the VSB.

In addition to these hands-on workshops, resource packages and access to a network of outdoor educators will ensure that teachers have the support they need to continue to incorporate outdoor lesson plans into their classrooms. Providing teachers with the information they need to design their own lesson plans will likely help to engage them more in outdoor learning activities (Personal communication, Julia Ostertag).

### ***Sense of Place***

Sense of place develops from learned experiences through seeing, hearing, smelling, tasting and feeling. Knowledge is acquired through these five senses as they

are open to impressions from the world around us and are delivered from well-designed green spaces that positively influencing the human mind (Driscoll, 2001). Defining sense of place requires the understanding of core values in a particular community's landscape, traditions, culture and heritage.

With the physical boundaries of a garden or outdoor learning classroom, learning extends much further to levels not common in the traditional educational curriculum. As children enthusiastically hunt for earthworms and other insects, others will learn about the physics of levers when using garden tools (Nebelong, 2008). Wendell Berry believes that “if you don’t know where you are you don’t know who you are” (Inspiring people to take responsibility for Earth, ND). This is not limited to being in one specific location; rather, it is about the kind of knowledge that involves sensory observations. Sense of place is to know a place, a location, and all its offerings; to who you are in that place and how it makes you feel; to know what that location is like in all seasons; to value it from invested labour; to simply be defined by the natural features of the place (Center for Ecoliteracy, 2004-2011)

Gardens serve as places that tantalize all the senses resulting in sensory and therapeutic effects, ready to stimulate, relax and enjoy without necessarily being productive. To have a sense of place is to experience and recreate where no one makes any demands, allowing only for opportunities to experience nature in honest of beings.

## **STAKEHOLDERS RECOMMENDATIONS**

Based on our results, there are several recommendations that we would like to suggest to the stakeholders of the Think&EatGreen@School Project. With regards to workshop demonstrations, hiring professionals to teach the workshops would ensure that the quality of the programs is conducive to educating teachers. Successful workshops

are more likely to be hosted by individuals who have relevant experience since they thoroughly understand all the techniques and have sufficient background knowledge to perform the workshops with confidence. Most importantly they will have a better ability to answer questions or concerns presented by the participants. However, university students should be encouraged assist with the programs. For the composting workshop, facilitators from the City of Vancouver can be hired to demonstrate how to establish a worm bin. It will also be more cost effective since often the professionals will have access to supplies that are lower in cost. As for the garlic workshop, facilitators from the Farm Folk and the City Folk can be hired to teach the basics about gardening and how to plant garlic and other crops suited to the Vancouver area.

In addition, coordinators of the Think&EatGreen@School Project should use the frameworks we created as a starting point to develop other workshops for the Summer Institute. Surveying teachers in Vancouver's Lower Mainland should be carried out to determine the gardening topics and activities teachers are most interested in as this will assist in workshop development.

We also recommend that *Turning the Earth: A Month to Month Guide to Your School Garden* (2007), which is published by the Vancouver School Board, be purchased for all the workshop participants. This guide includes a collection of lesson plans and activities for each month of a school garden's operation. These lesson plans can be used as examples in the workshops.

Finally, we suggest establishing connections between the workshops and other activities in the garden. As a result, the teachers will become more familiar with outdoor settings and comfortable with their environment, which will encourage their student's to prefer outdoor settings to an indoor classroom. There are also classroom activities that students can engage in, such as the many examples listed in "Worms eat our garbage:

Classroom activities for a better environment” by Mary Appelhof (1997). This guide consists of over 150 worm-related activities to develop problem solving and critical-thinking skills in the students along with a variety of courses, such as arts and ecology that could be integrated into the curriculum. Participating in these types of classroom activities further connects the students to outdoor environments.

## **PROJECT EVALUATION**

Overall, our team evaluated the 2011 UBCFSP as a successful learning experience. We encountered a number of successes throughout the duration of the project including the multiple opportunities to meet with our stakeholders, being assigned a tangible scenario to undertake, and having complete access to the project location throughout the course of the semester. These factors eased the transition through each phase of the project and helped our team to better visualize the final outcome of our contribution to the Summer Institute.

There were a few challenges that had to face in order to progress in the Education Programs scenario. First, it was difficult to decide on which workshop topics teachers would be most interested in since we were not able to collect the survey results before the initial researching phase. Despite the lack of survey results, our team managed to use previous UBCFSP papers to find relevant areas to focus on. Other challenges we had to overcome were logistical issues regarding team dynamics. We found it difficult to coordinate schedules to meet outside of class with six team members and tried our best to utilize the class time that was allocated for working on our scenario. However, additional meetings were necessary in order to achieve project outcomes. As a team, we had developed a timeline for the semester that included scheduling meetings with our project stakeholders so as to allow us adequate time to consider their feedback.

Unfortunately, we had to reschedule this meeting due a last minute conflict with guest speakers lecture in our intended project time. The effects of this timing change were especially detrimental because it took place at the end of the semester and we were not able to incorporate all of the feedback from our stakeholders into our workshops. Nonetheless, our team managed to overcome these challenges and accomplish the project objectives.

For future LFS450 students, we recommend designing workshops linking nutrition and cooking using school gardens. A number of benefits have been shown in previous interventions demonstrating the positive effects of implementing school gardens for mental and physical health and the significance of connecting the nourishment of land to the nourishment of humans. In addition, we recommend designing a beneficial insect workshop to complement outdoor gardening. Such an activity can be used to illustrate the need for insects in gardens and to be able to understand the difference between insects that are pests and destructive versus insects used for integrated pest management. Designing a soil science workshop on how to build an outdoor compost to feed school gardens is another theme that could be expanded upon. This project can be especially relevant for schools interested in reducing waste on a larger scale and wanting to take outdoor education to the next level.

These recommendations are specific, as they focus on a single workshop topic, measurable, since feedback can be received from stakeholders using a similar process that our group used, achievable and reasonable because similar projects have taken in place in other school settings, and time-bound since such a project can successfully be completed over the duration of one semester.

We would also like to recommend future research to focus on the psychological well-being of outdoor education, and the effects of improving teamwork skills while



building strong social networks. Also, we would like to see integration of other community members into the garden space for long-term sustainability of the school gardens.

For the LFS teaching team, we would like to recommend having timelines submitted from students to the instructor after feedback has been received from the TAs so that scheduling conflicts between stakeholder meetings and guest speakers can be avoided. We would also like to see the UBCFSP marking guide made available to the students at the beginning of the course, rather than midway through when teams should have already begun developing their draft paper outlines. Overall, more follow-up and organization from the teaching team would greatly benefit students in future classes. In addition, we would recommend that the teaching team advise students to set up stakeholder meetings during the first week of classes, and not wait for other course assignments to be completed. We would also like TAs to encourage students to branch out and meet people beyond their stakeholders. It is important to receive feedback from community members outside of the project management as they may provide additional comments that can enhance the project outcomes.

## **CONCLUSION**

With the success of each of the scenarios involved in the UBCFSP increased awareness on how individual food choices impact the natural resources of our planet will be realized. By incorporating garden-based education in an outdoor learning space children are encouraged to use their senses and make a connection to the life cycles of the earth. The workshop frameworks and resource lists that we created can be used by the Think&EatGreen@School Project in the Summer Institute professional development program. The feedback we received from our stakeholders indicated that our workshops

were a good starting point for the program and could be further developed and expanded upon to include more material and connect to other future workshops.

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## APPENDIX A

### Growing Garlic: Workshop Framework

Goal:

- educate children about parts of plants and their uses (medicine, food, edible parts)

Rationale:

- introduce the connection between the land, food, and education through school gardening activities

### Garlic Workshop Timeline:

<b>5 min</b>	<b>Introduction. Agenda – lesson plan for the workshop</b>
<b>15 min</b>	<b>Describe curriculum and relevant background information</b> <b>Give lesson on gardening basics and garlic:</b> <ul style="list-style-type: none"><li>• provide 9 month timeline for garlic plant to develop</li><li>• correct method to plant garlic clove and plant care</li><li>• importance of space between each plantings and sun exposure</li><li>• soil type requirements to grow garlic in Vancouver</li><li>• introducing manure/compost/fertilizer to strengthen plant growth</li><li>• describe how to harvest and store garlic in specific to Vancouver's climate</li></ul>
<b>15 min</b>	<b>Workshop on plantation</b> – Demonstrate how and where to plant garlic. Describe watering and feeding process of the plant. Brainstorm ways to protect the plant depending on location. Introduce ideas for activities to promote learning and establishment of sense of place.

**15 min**      **Ideas on how garlic growing relates to many aspects of education**

- **garlic superstitions and folklore** - how this can relate to current superstitions, inspire creativity in writing, art
- **history of garlic and its value in many cultural and sociological aspects** - how this is can be incorporated into social studies
- **science of garlic growth** - how this relates to all the sciences, parts of plant etc.

**10 min**      **Wrap up. Final questions.**

Discuss handouts and lesson plans

- timeline and milestones for garlic growing
- potential learning and fun activities for children

## **APPENDIX B: Growing Garlic Workshop Handout**

# Growing Garlic Workshop

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Growing garlic is a great way to incorporate a variety of lessons into many areas of the educational curriculum.

In Vancouver garlic is typically planted in October and harvested after 9 months.

### **Supplies:**

- outdoor space with a well-drained soil and good exposure to the sun
- garlic cloves
- soil and compost
- garden shovel or hand trowel
- leaves or straw for mulch

### **Timeline/Growth Process:**

#### **October**

- make a narrow trench with your hands about 4 inches deep in the soil
- place garlic clove *pointy sides up* into the hole
- allow around 6 inches between each plantation
- cover with at least 3 inches of soil and pat down
- do not peel cloves prior to planting
- add compost, mushroom manure, or fertilizer
- lightly water garlic with a *gentle* mist when the soil becomes dry
- bulbs with larger cloves will produce larger plants

#### **late November**

- cover garlic bed with dry leaves or straw mulch to protect the bulbs over the winter

### **February/March**

- first leaves of garlic plant will appear

### **July**

- plants should be about 2.5-3 ft tall
- garlic scapes should be coming out of the centers of each plant
- scapes are edible and can be harvested
- stop watering plants towards the end of July
- leaves of the plant will turn yellow as the plant matures

### **August**

- gently loosen soil around plant using garden fork/shovel
- do not pull the plant out as the bulb and stem may break
- gently lift out the bulbs with your hands
- do not wash off soil
- put garlic in a dry place and allow it to sit and dry out slowly
- soil will fall off easily after a week
- Storage: dark and cool areas, never refrigerate

### **Potential Learning and Engaging Activities:**

- record monthly observations with emphasis on sight, smell, and sounds in the environment
- use riddles for children to engage in learning processes of plant anatomy and photosynthesis
- share stories relating to home cooking and personal experiences
- drawing parts of the plant
- painting rocks for garden protection and decor
- use of leaf remnants for art projects such as self portraits
- children stories based on history and interesting facts of garlic
- prepare a meal with harvest to establish connection between land and food

### **Garlic Types**

- two types of garlic:
  - **Artichoke** - garlic has two rings of cloves
  - **soft-necked** (*Allium sativum*)
    - soft stems can be braided for storage
  - **hard-necked** (*Allium sativum* var. *ophioscorodon*)
    - more flavor, well suited for growing in Vancouver's cool climate

**Silverskin:** silvery-white, mild garlic taste, soft-neck garlic, stores well

**Rocamboles** – This hard-neck garlic forms a flower heads in the summer and can be identified by the purplish tinge to their skin. Although this is a much more gourmet garlic it does not store well, usually just a couple of months.

**Elephant** - The cloves of this garlic can weigh up to an ounce and will usually give up to 3 tablespoons of chopped garlic. Elephant garlic is actually a member of the leek family and has a much milder taste. If your growing conditions are cool and damp, this is the garlic to choose. The bulbs of elephant garlic should be spaced farther apart, usually 10 inches, to give the plants enough room to grow.

[www.allthatwomenwant.com/growinggarlic.htm](http://www.allthatwomenwant.com/growinggarlic.htm)

## **APPENDIX C: Growing Garlic Resource List**

### **Teacher Resource List**

#### **Garlic: Superstitions, Folklore and Fact**

[http://americanfolklore.net/folklore/2010/10/garlic\\_superstitions\\_folklore.html](http://americanfolklore.net/folklore/2010/10/garlic_superstitions_folklore.html)

#### **GARLIC SUPERSTITIONS & FOLKLORE**

- Egyptian slaves were given a daily ration of garlic, as it was believed to ward off illness and to increase strength and endurance. As indicated in ancient Egyptian records, the pyramid builders were given beer, flatbread, raw garlic and onions as their meager food ration. Upon threatening to abandon the pyramids leaving them unfinished, they were given more garlic. It cost the Pharaoh today's equivalent of 2 million dollars to keep the Cheops pyramid builders supplied with garlic.
- The Koreans of old ate pickled garlic before passing through a mountain path, believing that tigers disliked it.
- In Palestinian tradition, if the bridegroom wears a clove of garlic in his buttonhole, he is assured a successful wedding night. Among practitioners of Auryvedic medicine, garlic is held in high regard as an aphrodisiac and for its ability to increase semen.
- Greek athletes would take copious amounts of garlic before competition, and Greek soldiers would consume garlic before going into battle.
- It became custom for Greek midwives to hang garlic cloves in birthing rooms to keep the evil spirits away. This ancient custom became commonplace in most European homes.
- Roman soldiers ate garlic to inspire them and give them courage. Because the Roman generals believed that garlic gave their armies courage, they planted fields of garlic in the countries they conquered, believing that courage was transferred to the battlefield.
- European folklore gives garlic the ability to ward off the "evil eye". Central European folk beliefs considered garlic a powerful ward against devils, werewolves, and vampires. To ward off vampires, garlic could be worn on one's person, hung in windows, or rubbed on chimneys and keyholes. When diseases caused by mosquito bites were considered "The touch of the vampire," garlic came in handy as a mosquito repellent.

- Dreaming that there is "garlic in the house" is supposedly lucky; to dream about eating garlic means you will discover hidden secrets.

## GARLIC FACTS

- Garlic (*Allium sativum*) has been used for thousands of years for medicinal purposes. Sanskrit records show its medicinal use about 5,000 years ago, and it has been used for at least 3,000 years in Chinese medicine. The Egyptians, Babylonians, Greeks, and Romans used garlic for healing purposes. In 1858, Pasteur noted garlic's antibacterial activity.
- Historically, garlic has been used around the world to treat many conditions, including hypertension, infections, and snakebites, and some cultures have used it to ward off evil spirits. Currently, garlic is used for reducing cholesterol levels and cardiovascular risk, as well as for its antineoplastic and antimicrobial properties.
- There is a long history of using garlic to get rid of many insects, from slug to mosquito. In particular garlic has a reputation for protecting people from mosquito bites.
- During World War 1, the Russian army used garlic to treat wounds incurred by soldiers on the Front Line. Although Alexander Fleming's discovery of penicillin in 1928 largely replaced garlic at home, the war effort overwhelmed the capacity of most antibiotics, and garlic was again the antibiotic of choice. The Red Army physicians relied so heavily on garlic that it became known as the "Russian Penicillin".
- Today, garlic is used by herbalists for a wide variety of illnesses including high cholesterol, colds, flu, coughs, bronchitis, fever, ringworm and intestinal worms, and liver, gallbladder, and digestive problems. Several scientific papers have been published in the last two years which strongly indicate that garlic is highly efficient in preventing heart disease and cancer, and even reducing the severity of established cancer.
- Garlic Caution: Olive oil infused with fresh, raw garlic should not be left at room temperature to cure. While it may produce an awesome flavor, botulism threatens its safety. Garlic infused vinegar, on the other hand, is safe because the high acidic level of vinegar prevents spores of botulinum bacteria from incubating.
- Italians apply poultices of garlic to alleviate stomach aches. During the early 20th century they sent their children to school wearing necklaces made of cloves of garlic to prevent them from catching colds. Though this practice made them rather unpopular, it did keep them healthy.
- Dramatic results in treating animals infested with ticks showed that garlic was able to effectively kill the ticks within 30 minutes, while garlic proved to be a repellent toward new infestations. Garlic was also successful in treating cattle with hoof and mouth disease.
- In a study conducted in Russia in 1955, garlic extract used therapeutically was found to bind with heavy metals in the body, aiding their elimination. Workers suffering from chronic lead poisoning while working in industrial plants were given daily doses of garlic extract and saw a decrease in their symptoms. Other experiments that took place in Japan using mercury and cadmium also found that garlic bound with the heavy metals.

### **Garlic and the Black Death**

<http://articlesofhealth.blogspot.com/2009/01/black-plague-or-black-death-is-still.html>

Starting in the Crimea around 1400 BCE, the Plague or Black Death devastated Europe. The total number of deaths worldwide is estimated at 75 million people, approximately 25–50



million of which occurred in Europe. The Black Death is estimated to have killed 30% to 60% of Europe's total population. It may have reduced the world's population from an estimated 450 million to between 350 and 375 million in 1400. The plague is thought to have returned every generation with varying virulence and mortalities until the 1700s. During this period, more than 100 plague epidemics swept across Europe. On its return in 1603, the plague killed 38,000 Londoners. People noticed that the early Garlic Merchants did not get the Plague. Since the Plague was thought to be transmitted by Vampires, naturally Garlic must ward off Vampires. People took to wearing garlands of garlic, and smearing it on everything. What was actually happening is much more interesting. Garlic Merchants were poor. They ate a lot of their own Garlic. Garlic is now known to be a powerful, natural antibiotic, anti-acid and was "killing" or "buffering" off the Plague or the excess dietary and/or metabolic acids in the Garlic Merchants.

## **APPENDIX D: Composting Workshop Framework**

### Goals:

- connect the principles of composting to the food cycle
- introduce nutrient cycling and other cycles of life found in the garden
- explain the use of living organisms and their function in the environment

### Rationale:

- illustrate the importance of reducing food waste and returning nutrients back to the land and our food system
- vermiculture composting offers an alternative to more labor intensive methods of outdoor composting

### Resources:

- Worms Eat Our Garbage: Classroom Activities for a better environment. (1982). By: Mary Appelhof, Mary Frances Fenton, Barbara Loss Harris.
- Turning the Earth: A Month to Month Guide to Your School Garden. (2007). Cruickshank, Susanne et al. Published by Vancouver School Board.

### **Composting Workshop Timeline:**

- |               |  |
|---------------|--|
| <b>5 min</b>  | <b>Introduction:</b> <ul style="list-style-type: none"><li>• <b>Agenda</b> – lesson plan for the workshop</li></ul>  |
| <b>15 min</b> | <b>Describe curriculum and relevant background information. Give lessons on composting and vermiculture concepts:</b> <ul style="list-style-type: none"><li>• Worm anatomy</li><li>• Nutrient cycling and value of compost (organic matter) in soil building</li><li>• Incorporating worm castings and other completed compost into the garden</li></ul> |

- 20 min Workshop on establishing worm compost bin (hands on):**
- Demonstrate how to set up a worm bin
  - What to feed the worms
  - Discuss daily/weekly care needed for maintaining the worm bin
  - Troubleshooting problems (smell, moisture, fruit flies)
- 10 min Ideas on how also to connect with the Outdoor Learning Garden:**
- **Creating a connection with the space** – learning about native animals of the area; take a sensory tour of the garden (use vision the least); work within the space to develop respect for time spent laboring in the garden
  - **Learn about the Musqueam people who used to live on the land** – tell stories of the peoples history/culture
  - **Discuss how seasons affect the land** – build on the connection of why/how food is grown when and where it is according to plant specific needs to grow
- 10 min Wrap up and final questions:**
- **Handout** – supply list; instructions for compost and worm bin care; resources for learning activities

## APPENDIX E: Composting Workshop

### COMPOSTING WORKSHOP

#### How to Make a Worm Bin

##### Supplies

- 2 plastic bins
  - 8-10 holes 1cm apart on bottom
  - holes around the side for ventilation
- fine mesh screen - to cover holes
- red wiggler worms
- bedding material
  - straw, grass clippings, dried leaves
  - shredded paper, ground cardboard

#### What do I feed my worms?

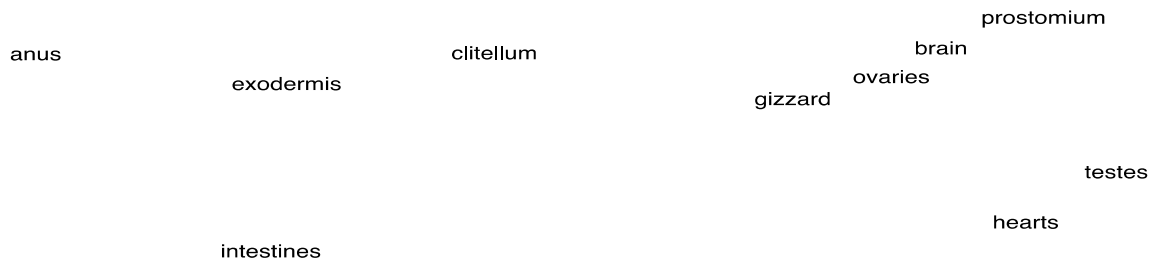
##### YES

- fruits and veggies
- eggshells
- leaves
- teabags
- coffee grounds
- grass clippings
- shredded paper

##### NO

- meat
- dairy products
- oil
- cooked food waste

## Worm Anatomy



### Worm Facts:

- do not have lungs and breathe through their skin
- also do not have any eyes, ears, teeth, or a nose
- similar to birds, the gizzard acts like a stomach where food is digested
- have 5 hearts - all the more to love you with
- **cannot** be cut in half - they will **not survive** ☹️
- are very light sensitive and will hide from the sun

### History of Worms in Agriculture

Most of the Canadian earthworm species are considered exotic and have been distributed through our landscapes by human activity. Of the 27 species of earthworms that have been found in Canada only 8 of them are native. Many of these native species are typically found in well-established forests and are not related to agriculture. Earthworms are classified as either deep (anecic), mid (endogeic) or shallow (epigeic) burrowers and are connected to all aspects of soil quality. (Tomlin, A. D. and Fox, C. A. 2003)

### Worm Colonization of Canada:

Historically, it is believed that the use of land for fur trading and agriculture food production led to the introduction and distribution of earthworms across the landscape where environmental conditions were suitable for colonization following the European colonization of North America. When colonists first arrived on Canadian shores there were no quarantine regulations for imported soil and plant materials.

Colonists brought with them Palearctic earthworms on their plant stock which most likely contained soil contaminated with earthworms and cocoons. It is thought that as European colonization and agriculture expanded across the continent, the exotic earthworm anthropochores (dependent on human activity for both their introduction and dispersal) travelled with the human populations that had introduced them to North America. Settlers and farmers may have also introduced worms intentionally hoping to sustain or improve soil fertility.

<http://ginkgo.cisti.nrc.ca/RPAS/rpv?hm=HInit&journal=cjss&volume=83&afpf=S01-062.pdf>

### ARE EARTHWORMS IMPORTANT? <http://www.backyardnature.net/earthwrm.htm>

- earthworms *plow the soil* by tunneling through it
- create passageways so air and water can circulate
- improve soil structure so plants can grow
- earthworm castings are rich in nitrogen, calcium, magnesium, and phosphorus

## Common Earthworm Species

### ***Lumbricus terrestris***

Common Name: Nightcrawler or Dew-worm

- largest earthworm found in Canada
- can live up to 10 years

### ***Eisenia foetida***

Common Name: Manure worm, Tiger worm, Red Wiggler

- used for fish bait and composting
- live in manure and high organic matter

### ***Aporrectodea tuberculata***

Common Name: Canadian worm

- most common worm found in Canada
- lives near water or streams

## APPENDIX F: Composting Resource List

### Teacher Resource List

- Evergreen: Lesson plans and overall great resource for outdoor educators.  
<http://www.evergreen.ca/en/resources/schools/teachers/lesson-plans/>  
<http://www.evergreen.ca/en/resources/schools/teachers/index.sn>  
<http://www.evergreen.ca/en/resources/schools/curriculum.sn>
- Global, Environmental and Outdoor Education Council: Sample lesson plans and outdoor curriculum for grades 1-9.
  - <http://www.geoec.org/lessons/index.html>

### Worm Bins and Composting

- **Compost and Mulching: Evergreen**
  - Complete garden guide to composting.
  - <http://www.evergreen.ca/docs/res/Design-Ideas-2-Compost-Mulch.pdf>
- ***Worms Eat My Garbage: How to set up and maintain a worm composting system.*** (1997). By: Mary Appelhof.
  - Mary Appelhof is the guru of vermiculture and has written several books about using worms to process organic waste.
- **The Teachers Guide to Vermicomposting**

- This resource has all the information that teachers will need to know about setting up Vermicomposting in their school or classroom:
- <http://www.worms.com/teachers-guide-to-vermicomposting.html>
- **Worm Watch**
  - WormWatch is a science-based education program that is part of a national volunteer monitoring program used to identify ecological changes that may be affecting our environment. This site describes the importance of worms as an indicator of soil biodiversity, worm anatomy and ecology, and provides tools and resources to enable you to identify and monitor worms.
  - <http://www.naturewatch.ca/english/wormwatch/>