Food Systems Biodiversity Engagement Toolkit

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In collaboration with LFS 450, SEEDS Sustainability, UBC Food Services, UBC Botanical Garden, UBC Seeds Lending Library, & Climate Crisis in Urban Biodiversity

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Preface

This toolkit is designed to provide a foundation for enhancing campus food biodiversity, specifically targeted towards the biodiversity within the University of British Columbia (UBC) Vancouver campus food system. It was developed using participants' survey responses which targeted three audiences: UBC students, chefs, and community gardeners. It contains information from survey responses, UBC-specific biodiversity resources, and relevant online sources.

Introduction

Purpose

The purpose of the Food Systems Biodiversity Engagement Toolkit is to provide educational and practical resources for University of British Columbia community members (i.e., UBC students, chefs, and community gardeners) to learn, engage in, and foster actions which enhance the food system biodiversity within the UBC campus and beyond.

About this Toolkit - How this Toolkit was developed:

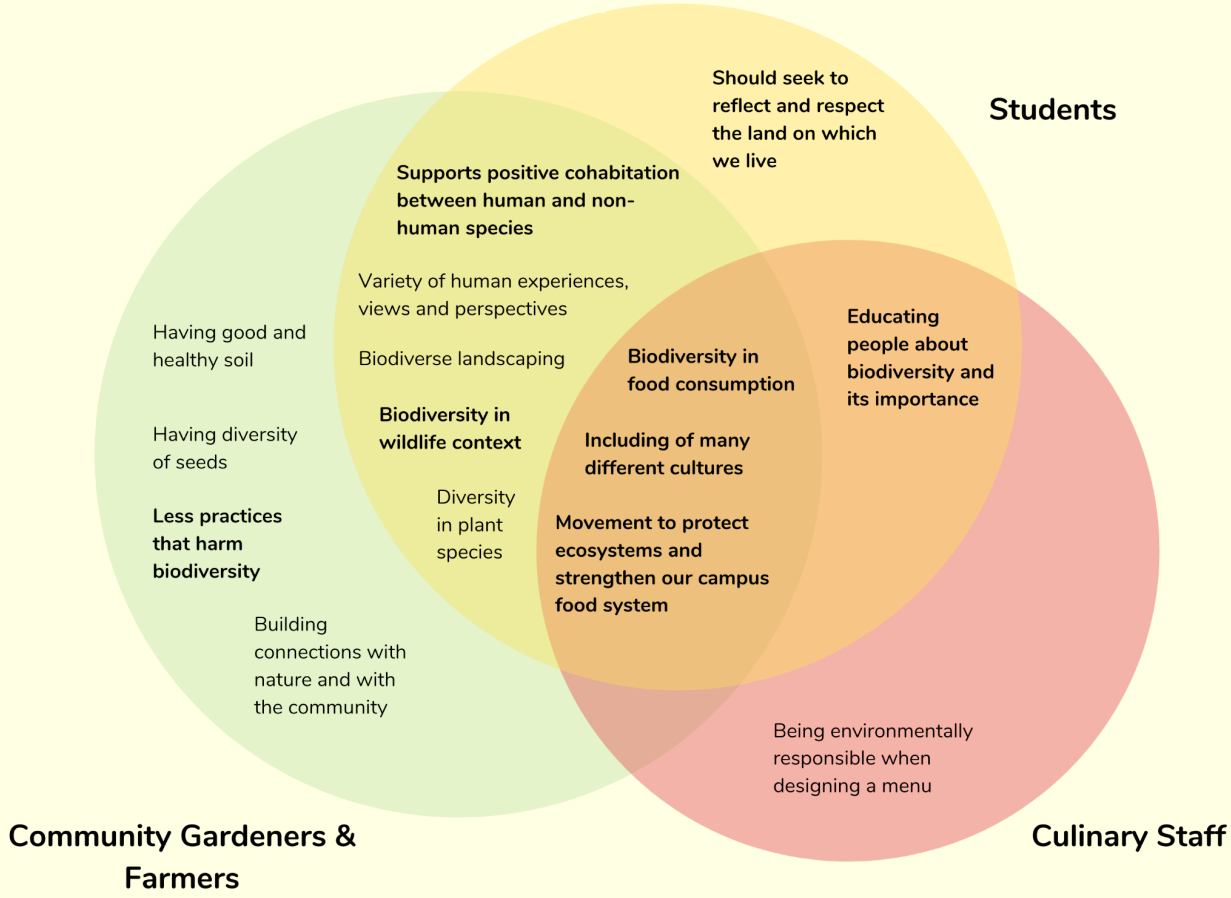
In 2021, a group of students from the Land and Food Systems 450 course in collaboration with the UBC Food Services, UBC Botanical Garden, Seeds Lending Library (Education Library), and Climate Crisis in Urban Biodiversity (CCUB) conducted a Community-Based Action Research project with the goal to increase community action and engagement towards more biodiverse food garden production and culinary menu options within the UBC food system.

To achieve this goal, input was obtained through surveying UBC students, chefs and community gardeners to elicit inputs that could inform a common and holistic definition of what campus food biodiversity means from various perspectives, and identify knowledge gaps and opportunities to increase action and engagement to promote food system biodiversity.

Defining 'Campus Food Biodiversity'

Through our research we found that there was no definition for campus food biodiversity, therefore participants from our surveys were asked to define what the term campus food biodiversity (CFB) meant to them. Based on input elicited from UBC students, chefs and community gardeners, Campus Food Biodiversity spans a spectrum of these interconnected themes:

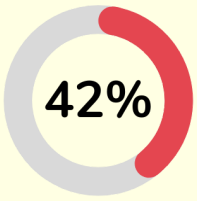
What does campus food biodiversity mean to you?



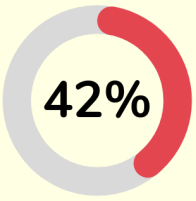
Common Chef Responses

mention "being inclusive of many **different cultures**"

mention "exploring **new flavours**"

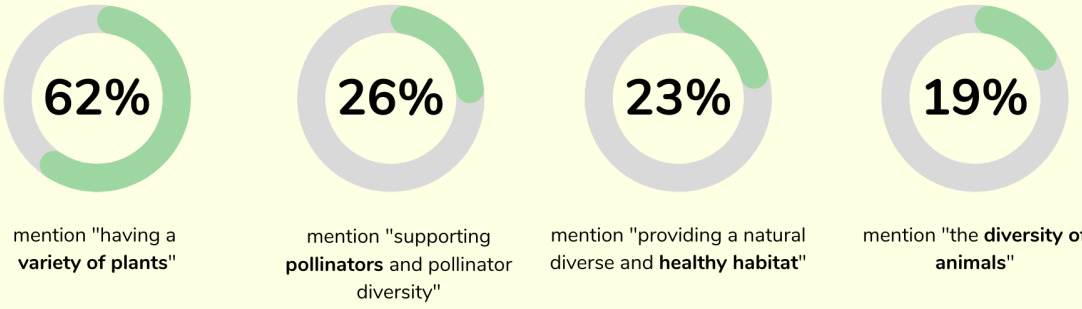


mention "supporting biodiversity **through the food we eat**"

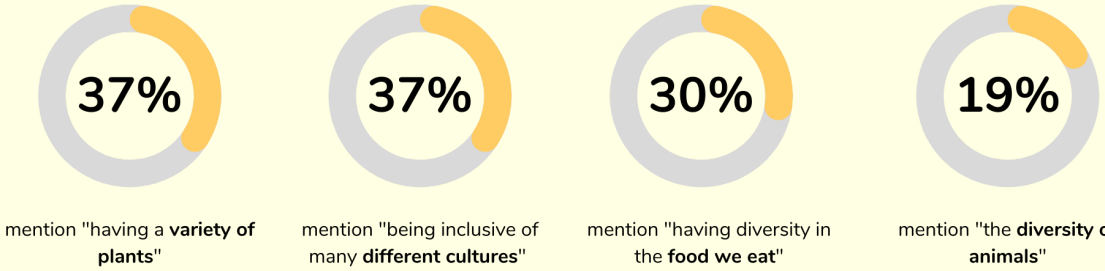


mention "supporting biodiversity **in the food we eat**"

Common Community Gardener Responses



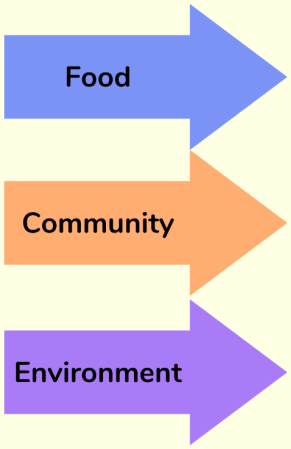
Common Student Responses



Campus Food Biodiversity Definition

A compiled community-based definition which incorporates common themes between our three targeted audiences (i.e., UBC students, chefs, and community gardeners) was produced, whereby Campus Food Biodiversity refers to:

What is campus food biodiversity?



"Within the context of UBC, campus food biodiversity refers to:

1. the variety of food production and consumption present on campus, which is
2. shaped by the cultural and experiential diversity of the community, and
3. aims to protect and respect the land on which it resides by strengthening the resilience of its food system."

WE HEARD FROM YOU!

Barriers identified by the community

*Note: The colored arrows indicate similarities between the two audiences.

Strategies identified by the community

*Note: The colored arrows indicate similarities between the two audiences.

1.0 Biodiversity-Friendly Food Profile: Diversifying Food Ingredients

The Biodiversity-Friendly Food Profile provides a list of uncommon ingredients that can be utilized by UBC Food Services to support campus food biodiversity. These ingredients aim to be part of food menus and provide appropriate choices for diverse groups of students while supporting agricultural biodiversity . This is only an initial list, so there are a lot more ingredients that could be included moving forward! We encourage UBC Food Services to experiment with an array of cooking methods to fully extract the flavours and nutrients of *each* new ingredient. Enticing students' palates is key to developing continuous interest in the consumption of unfamiliar foods! However, precautions are needed when processing certain ingredients, like lupins, because they could cause poisonous effects and life-threatening allergy reactions.

1.1 Ingredients for Food Diversity

From the list of 11 different food items that UBC Food Services are hoping to integrate into menus, 50% or more of students said that they have heard about:

1. Sprouted beans
2. Algae (spirulina)/ seaweed (wakame)
3. Jackfruit
4. Ube
5. Sorghum
6. Amaranth
7. Moringa

When students were asked which foods they would like to see served more on campus, common answers include more vegan options, Asian foods, and Indigenous foods.

1.2 Different Food Items

1. **Sprouted beans**

Sprouted beans refer to beans which have germinated and sprouted the first root (radicle). According to this article, once the seeds are sprouted, we can theoretically access the nutrients which are used to aid the initial growth of the plant which are usually made unavailable due to the acid, phytate. Therefore, sprouted beans provide more nutritional benefits compared to unsprouted beans.

2. **Algae (spirulina)/ seaweed (wakame)**

Spirulina is one of the world's most popular supplements as it has many health benefits. It contains a high concentration of nutrients like protein, vitamin B1, vitamin B2, vitamin B3, copper, and iron. In addition to high concentration of nutrients, they also have antioxidant and inflammatory properties.

Seaweed like spirulina is rich in nutrients like vitamin A, B12, and K. In addition to the health benefits, seaweed is one of the few foods which can have a positive impact on the environment. A study in China looked at the environmental benefits of seaweed

aquaculture and found they removed excess nitrogen and phosphate from the coastal waters, sequestered carbon, and produced iodine. Therefore, demonstrating that seaweed aquaculture has turned pollutants which cause eutrophication into available nutrients. However, there are potentially negative effects of seaweed farming which should be taken into consideration.

3. **Jackfruit**

Jackfruit is rich in vitamin A, vitamin C, vitamin B2, magnesium, potassium, copper and manganese. It also contains decent amounts of carbs, fiber, and protein. This fruit is also a good meat substitute due to having a texture akin to shredded meat.

4. **Ube**

Ube, also known as purple yam, is rich in antioxidants and contains more nutrients than regular yams. It is rich in potassium, calcium, and vitamin A and C.

5. **Sorghum**

Sorghum is rich in a variety of nutrients like vitamin B1, vitamin B2, and zinc. It is also known to have a similar protein content as quinoa.

6. **Amaranth**

Amaranth is an ancient grain that is notably high in protein. The seed can be popped or flaked like oatmeal, and is generally used similarly to quinoa. It has been considered to have long-term potential for growing in the southern Canadian prairies.

7. **Moringa**

Moringa can withstand both severe drought and mild frost conditions, thus can be widely cultivated across the world. Moringa leaves, pods, and seeds are very rich in nutrients such as calcium, vitamin A, vitamin C, potassium, and iron. It can be processed and used for its seed flour, and its leaves can be eaten raw or cooked.

8. **Fonio**

Fonio is a fast-growing grass species that is tolerant of dry conditions. It is cultivated as a cereal crop, and is high in iron, calcium, and several essential amino acids.

9. Wild rice

Wild rice is well suited to Canada's growing environment, and is the country's only native cereal. It can be grown in shallow lake and river systems which don't require drainage control, and is often grown by Indigenous producers.

10. Lupin

Lupin beans are legumes that can be cultivated around the world in a variety of soil conditions. They have one of the highest protein levels among legumes and are rich in amino acids, thus can be used for the replacement of animal proteins. Lupin also fixes nitrogen and absorbs phosphates from the soil, making it a very sustainable crop.

11. Oca

Oca tubers are easy to grow in the Pacific Northwest, and are produced during the fall for November harvest. Oca is approximately as tolerant to heat as potato but has less problems with disease. It is softer than potato and can have a variety of flavours from mild to acidic and sweet to starchy.

12. Sorrel

Sorrel is a cool-season plant whose leaves can be harvested all season long. Sorrel has a lemony, sour flavour and can be added to salad mix. It is rich in vitamin A and vitamin C, and can be used as an astringent, diuretic, and laxative.

13. Tepary bean

Tepary beans are ancient crops that are heat and drought tolerant. They are native to the southwestern United States and Mexico and have been cultivated by Indigenous people. They provide slightly more protein than common beans like pintos or kidney, and also contain higher amounts of calcium, niacin, iron, zinc, and other nutrients.

1.3 Can Gardeners Use the Food Profile Too?

Yes! As the Food Profile develops, gardeners could benefit from the list to get ideas about crops they might want to grow. Gardeners can also refer to the GrowGreen Guide, an online resource developed by Metro Vancouver and the UBC Botanical Garden. Their helpful Pick-A-Plant tool helps you find the perfect non-invasive plants to grow in your garden or lawn.

- **http://www.growgreenguide.ca/plants**

Sources

https://doi.org/10.34885/172
https://hort.purdue.edu/newcrop/proceedings1999/v4-015a.html
https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10145

1.4 Marketing Strategies

- **Product**

  Creating sample packs of food kits that contain a variety of biodiverse food ingredients (i.e., those listed in section 1.2) and simple recipes that allow chefs, students, and community gardeners to familiarize themselves with the ingredients at their own convenience. Packaging is a significant component of promoting the product and it can enlighten the consumers about the service, benefits, and significance of using diverse ingredients

- **Promotion**

  As indicated by the results of the survey, many appreciate free samples as a way to test and try the ingredients. It is important to choose the perfect venue, with the right time, right location and event for the promotion of products. i.e UBC dining areas during lunch or dinner rush, and/or community gardeners community events.

- **Encourage regular use of food profile**

  While many will be open to receiving free products and testing them out, they do not always continue to use the ingredients. An important strategy is to ensure that consumers are able to use the food profile conveniently and have access to diverse ingredients at an affordable price.

- **Feedback**

  There is no better way to improve the use of biodiversity-friendly food profiles than incorporating the consumer's feedback. Whether it is students', chefs', or community gardeners', strong connections must be made in order to address the concerns/needs of the users. Social media is a powerful tool in this area which enables interactive and engaging ways of communication.

2.0 Seed Saving Resources

Different crop families required different seed saving strategies. As a general rule, we can only seed seeds from heirloom or open-pollinated plants to produce seedlings that show close traits of parent plants. If seeds from hybrid plants are collected, the seedlings grown will not retain the true characteristics of both parent plants.

2.1 Seed Saving Methods

2.1.1 When Can You Start?

Most seeds should be saved at the same time that the plant would naturally disperse its seeds. If the seeds come inside an edible package (like a tomato), let the fruits hang on a week or so longer than if they were to be harvested for fresh eating.

2.1.2 Not All Seeds Are the Same

Generally, there are two main methods of saving seeds:

1. Wet method
    - Wet seeds, such as tomatoes, eggplants and different types of squashes typically involve removing the pulp (containing the seed) and soaking it in water for a few days while intermittently mixing it.

2. Dry method
    - Dry seeds, such as beans, onions, and basil are easier to harvest, and typically involve drying and crumbling seed pods or husks to separate seeds from the chaff.
    - If the seeds come in pods or seed heads (such as peas, beans or radishes), they should be dried (preferably still attached to the plant) before harvesting.

2.1.3 Cleaning Seeds From Fruit and Seed Head

The best fruits and veggies would usually produce the best quality of seeds. For example:

a. It is advised to save seeds only from the biggest tomato of the bunch and replant them year after year, to eventually end up with seeds that produce plants with only bigger tomatoes.
b. Save seeds from disease resistant plants.
c. Save seeds from the healthiest and tastiest plants.

For wet seeds:

1. Scoop seed mass and place it in a container filled with water at room temperature for a few days.
2. Stir the mass once a day.
3. After a few days, the viable seeds (good seeds) will be sitting at the bottom, while unviable seeds will float atop.
4. Drain and rinse the good seeds thoroughly.
5. Dry the seeds on sheets of newspaper/ paper towel or screens kept indoors out of breezes.
6. Small seeds will dry within 1-2 weeks, larger seeds take longer time (i.e., 2^{+} weeks).
7. Store seeds inside an airtight container (i.e., paper envelopes, seed packets, or glass jar) and keep it in a cool, dark place with no temperature fluctuations (i.e., refrigerator).
8. Label the container with the name and date.

For dry seeds:

1. Collect seeds from dried pods or seed heads (preferably still attached to the plant).
2. Remove excess plant debris by shaking seeds over screens or kitchen strainers.
3. Store seeds inside an airtight container (i.e., paper envelopes, seed packets, glass jars) and keep it in a cool, dark place with no temperature fluctuations (i.e., refrigerator).
4. Label the container with the name and date.

2.1.4 Let's Test for Seed Viability

Almost all vegetable seeds remain viable for a year or two, but some last much longer. To test seed viability, place seeds on a wet paper towel and check for sprouting within a few days.

2.2 Additional Resources for Seed Saving

From this website: 104Homestead

It has a full list of resources for saving specific types of seeds, from beginner seed-saving techniques to advanced seed-saving techniques. The types of seed saving provided in the website are categorised as follows:

Easy	Intermediate	Hard	Herbs	Flowers
Arugula Beans Endive Lettuce Leeks Peas Radishes Tomatillos Tomatoes	Asparagus Beets Bunching Onions Carrots Chard Chilli Peppers Eggplant Parsnips	Broccoli Brussel Sprouts Cabbage Cauliflower Corn Cucumbers Kale Melon Pumpkins	Basil Chervil Chives Cilantro/ Coriander Dill Garlic Lovage Marjoram	Bachelor Buttons Calendula Columbine Cleome Lupines Marigolds Milkweed Morning Glory Nasturtium

	Peppers Salsify	Squash Turnips	Oregano Parsley Sage Salad Burnet Thyme	Poppy Sunflowers Yarrow

2.2.1 Youtube Videos on Seed Saving

How to Save Seeds of All Sorts by Roots and Refuge Farm

- ✿ https://www.youtube.com/watch?v=2Ipi14eLVfc

3 Steps to Store and Keep Seeds Fresh for Up to 5 Years

- ✿ https://www.youtube.com/watch?v=StHze-bVdCw

HOW TO: Save Seeds & Start You Own Seed Bank

- ✿ https://www.youtube.com/watch?v=03C9_A3ioVc

2.2.2 Resources on Campus: UBC Seed Lending Library

The Seed Lending Library at UBC (located in the Woodward Library and the Education Library at the Vancouver campus), serves as a platform that allows anyone to “borrow” seeds free of charge, and provides opportunities to learn about gardening, seed saving and agricultural research and teaching at UBC. The library operates on the honour system and borrowers are expected to return seeds at the end of the growing season to keep the library well stocked. If borrowers are unable to save their own seed, it is suggested that they donate 1-2 packets of commercially grown, open pollinated seeds at the end of the season. The process to use seeds from UBC Seed Lending Library is as follow:

❏ Process:

1. Visit the library

2. Browse and select seeds
3. Fill out a paper or online form and hand it to a staff member at the Information Desk
4. Take seeds home
5. Repeat process

In the following section, Section 3.0, we discuss in more details regarding strategies to enhance seeds-related engagement through the UBC Seed Lending Library.

For other details about UBC Seed Lending Library , please visit https://guides.library.ubc.ca/seedlendinglibrary/home

2.3 Bridging the Knowledge Gap

In the vicinity of the UBC Vancouver campus, there are a total 11 community gardens, in addition to the UBC Farm. While places such as UBC Farm and Roots on the Roof have been providing a range of workshops aimed to enhance food literacy and food security on campus. Some community gardens such as the Hawthorn Community Garden, Rhodo Garden and Acadia Park Garden are managed by the University Neighborhood Association (UNA). These

community plots allow residents to grow their food and flowers, and residents are allowed to renew their subscription by the end of year. As such, there is a constant turnover of community gardeners with varying expertise and experiences in community gardens. In order to bridge their experiences, the following strategies can be carried out in a short-term to long-term period.

2.3.1 Strategies to Enhance Community Engagement in Seed Saving and Seed Sharing

- Conduct seed-saving and seed-sharing workshops on a fixed time interval to allow participants to interact and build relationships through community gardening. Workshops can be held on a biweekly, monthly or annual basis depending on public interest and resources available.

- Develop a series of video tutorials including how to use UBC Seeds Lending Library as a resource - audios and visuals are easier shared to reach a wider range of audience in comparison to reading materials. UBC Seeds Lending Library could collaborate with existing resources such as UBC Studios to create digital content on seed resources, to be distributed and shared during networking events or through personal communication means.

- Invite guest speakers to workshops to share tips on producing a biodiverse-friendly community garden. The management department of community gardens (ie, UNA) can reach out and collaborate with existing experienced seed saving communities such as the UBC Farm to conduct various types of seed saving workshops.

- Potluck event with gardeners to allow opportunities for cultural and culinary exchange. During this event, it should be encouraged that participants share food stories regarding their roots and cultures. Topics discussed include but are not limited to:

    - How are the cuisines prepared?
    - What is the history and/or tradition tied behind specific dishes?
    - What are the methods of processing a certain ingredient to cook?
    - What do you like most about making this dish?
    - Is there a certain occasion in which this food is prepared for?

Sources:

https://www.motherearthliving.com/vegetable-gardening/seed-saving-how-to-save-seeds

3.0 UBC Seeds Lending Library Strategy

The UBC Seed Lending Library (SLL) has been active for the last three years, with the exception of summer of 2020 due to the COVID-19 pandemic. Until now, there has not been a specific program developed for increasing and preserving food biodiversity within the library. Due to this, our group developed a Seed Lending Library Strategy that contains a biodiversity program and other recommendations to enhance food biodiversity at UBC. We believe that with this strategy, not only would encourage more people to use this convenient resource, but also will create a headquarters where gardeners can borrow seeds, learn more technical skills, and exchange knowledge with one another.

Overview of biodiversity program:

- The SLL will implement a biodiversity-specific lending program (BLP).
- The goal of this program is to save and exchange seeds of uncommon edible crops to preserve/increase the overall food biodiversity in community gardens.
- The BLP will consist in granting “veteran seed-savers” access to an exclusive variety of heritage seeds and/or uncommon heirloom varieties for them to grow and seed save. The seed-saver gets to choose 1-2 options from the biodiversity-specific seed selection.
- Additionally, the SLL will provide sufficient technical resources to grow these uncommon crop varieties so that veteran seed-savers have some guidance.
- Once seeds have been saved, they will be appropriately labelled (Name of crop, year, generation number from original crop) and uploaded to the biodiversity-specific seed selection in the SLL website so that gardeners have one more option to choose from.

- For purposes of the BLP, “veteran seed-savers” are those who have successfully used and returned seeds to the SLL for at least 2 seasons. *Note: Gardeners that return packaged seeds at the end of the season will not qualify as veteran seed-savers.*

To put this program into action, we propose the following steps:

1. **Diversifying Seed Inventory**
    a. Incorporating more heritage seeds or heirloom seeds through third-party suppliers.
    b. Incorporating uncommon varieties of food crops through UBC farm or another seed library in Vancouver.

2. **Start development of technical resources that veteran seed-savers can utilize**
    a. Including appropriate number of plants to grow, appropriate number of seeds to obtain, and how the storage of these seeds should be to have good-quality seeds.
    b. Creating specific “management tips'' for crops that are not well-known. This will be particularly helpful for heirloom seeds.

To compliment our SLL strategy, we also propose the following:

1. **Build network with all community gardeners on campus**
    a. Through partnerships with UNA, community garden’s coordinators, and UBC farm.
    b. Using OUR LIST OF CONTACT EMAILS (which was given to our team by one of our stakeholders) to start a New’s Letter email so that all gardeners coordinators always know updates from SLL.
    c. Partnership/sponsoring by AMS could also be a possibility since biodiversity preservation could be included in UBC’s Climate Action Plan 2030.

2. **More technical workshops host by SLL (in partnership with other associations)**
    a. Best practices to start seeds depending on the plant. Example:

Best when **Directly Planted**	Best when **Transplanted**
Corn, beets, carrots, turnips, radish, arugula, beans, mustards, squash	Tomatoes, peppers, leeks, basil, lettuce, onions, broccoli, cauliflower, kohlrabi, eggplant, collard, cabbage

    b. Best practices to manage crops present in the biodiversity-specific seed selection (i.e., proper methods of germination, watering, and pest management)

    c. Multi-media gardeners tips (teaching resources) in the form of videos, workshops, or subscription newsletters.

3. **Hosting knowledge sharing events**
    a. Seed sharing festivals where people gather to network with others to exchange seeds, experience, and knowledge.

3.1 Marketing Strategies

- Organize in-person events and workshops regularly with different cultural or educational themes. This will allow for a safe and inclusive learning environment for diverse groups of gardeners to share their knowledge, success stories, and even hardships of conducting different practices
- Advertise events through social media platforms (i.e., facebook and instagram) and other UBC channels (i.e., faculty newsletters).

- Use nutritional value and taste as a marketing focus to incentivize more community gardeners to grow new crops.

Thank you for taking your time to read this toolkit on enhancing campus food biodiversity. The information used and developed is targeted for the UBC Community. However, this toolkit can be adjusted and adapted for different institutions as it fits. We hope that this document not only serve as a guide, but also as a source of inspiration to conserve and enhance biodiversity and to produce a food system that would last for centuries to come. Kind reminder that our existence is temporary, but it's what we are able to accomplish that creates the ripple effect for others, cheers.

Wish you all success!