



Kwantlen Polytechnic University

Department of Sustainable Agriculture

**KPU Farm @ Garden City Lands
2022 Report**

**City of Richmond Department of Parks, Recreation,
and Cultural Services Committee**

June, 2023

Introduction



Kwantlen Polytechnic University has now completed five growing seasons at the KPU Farm on the Garden City Lands. The first three hectares (Phase 1) were certified organic by the BC Association for Regenerative Agriculture in April of 2021, upon completion of the three-year organic transition period.

Highlights of 2022 include our first ever KPU Kids Camp at the KPU Farm, Construction of the Learning Garden, installation of the Phase I of the high density tree fruit orchard, planning for expansion onto the remaining five hectares (Phase 2) of the license area, and plans to construct a storage barn to replace temporary infrastructure at the site.

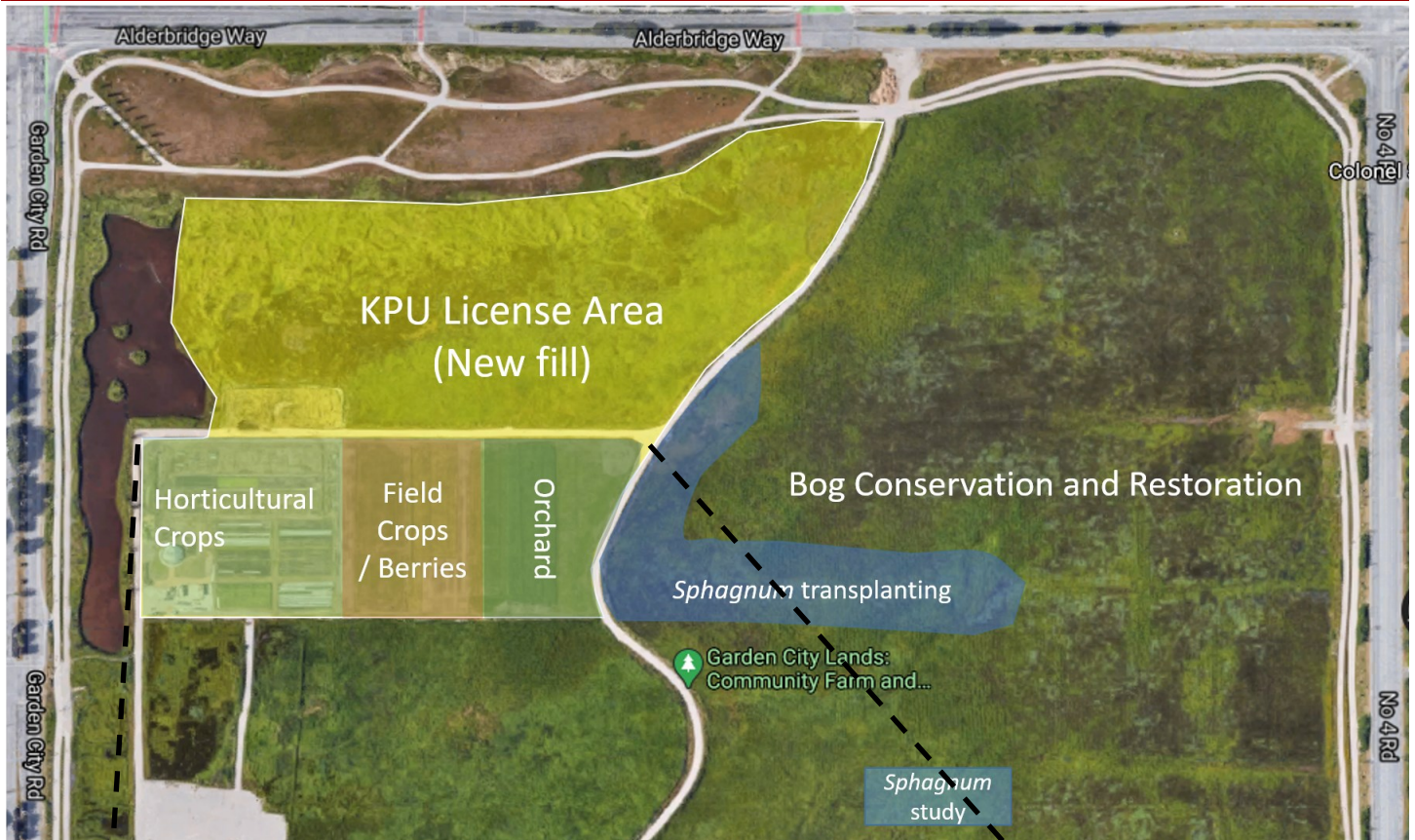
In 2022 we harvested 20 metric tonnes of certified organic produce from the site, with a retail value of 123 thousand dollars. This was sold at a Tuesday afternoon Kwantlen St. Farmers Market across from City Hall, through a variety of wholesale channels, or donated to the Richmond Food Bank. Our capacity to scale up is limited only by labour.

At the end of 2022, the city deposited peat on the northern parcel of KPU's License to Use area and then topped with mineral soil. We are awaiting additional mineral soil and the installation of drainage so that we can begin our operations on that portion of the land.

We are grateful for the support from the City of Richmond that continues to enable the KPU Farm at the Garden City Lands to teach and demonstrate community-engaged sustainable agriculture.



Farm Maps—2022



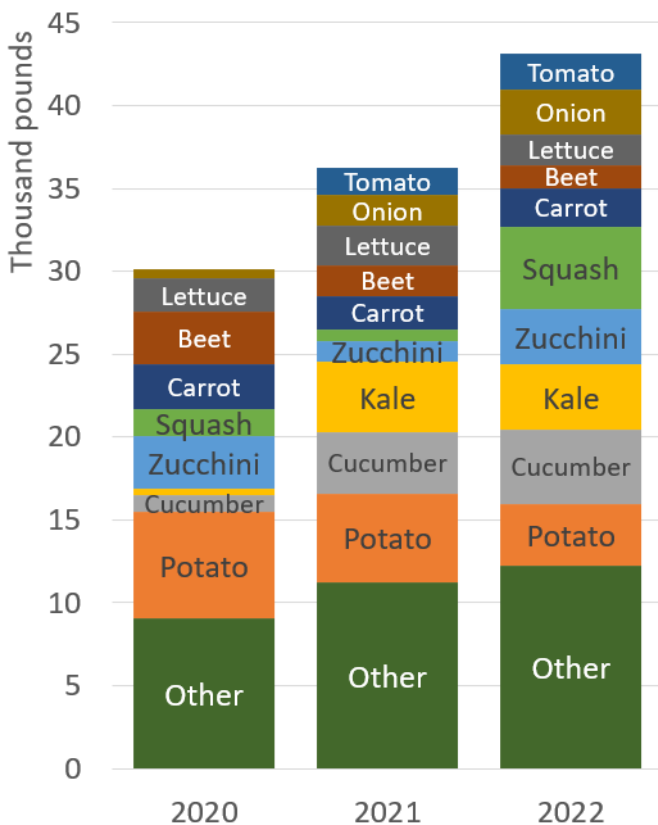
Crop Production

The KPU Farm at the Garden City Lands produced 43 thousand pounds (20 metric tonnes) of certified organic vegetables in 2022, with a retail value of 123 thousand dollars. Yield and crop value increased by 42% and 62%, respectively, since 2020. More than 40 different crops were grown. The 10 most productive are shown by the coloured slices in the Crop Yield bar graph below.

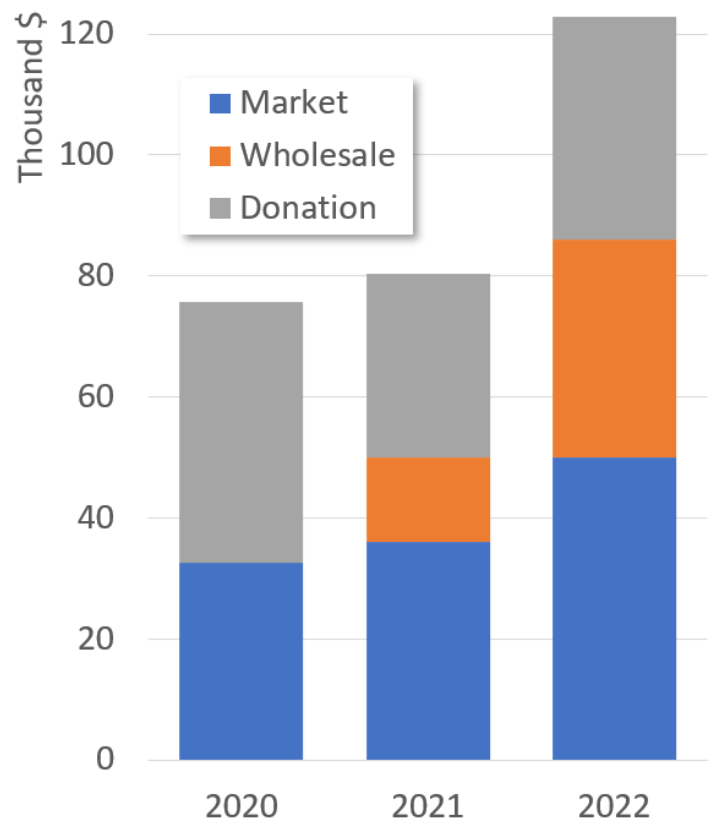
The harvested produce was either sold or donated, as shown in the crop value bar graph below. The Richmond Food Bank accepted more than 36 thousand dollars worth of produce donations in 2022, bringing the value of donations during the three years of the pandemic to more than 110 thousand dollars. Sales in 2022 totaled 86 thousand dollars, with 50 thousand dollars in direct sales at the Kwantlen St. Farmers Market, and 36 thousand dollars from wholesale distributors that prioritize local organic produce, including Discovery Organics and the Jarr package-free delivery service. Wholesale sales accounted for most of the sales growth over previous years.

Salad mix, cucumber, and tomato were the top-selling crops at the Farmers Market, while kale, cucumber, and fresh ginger led wholesale sales. Cucumber, winter squash, and tomato were the most donated crops.

Crop Yield



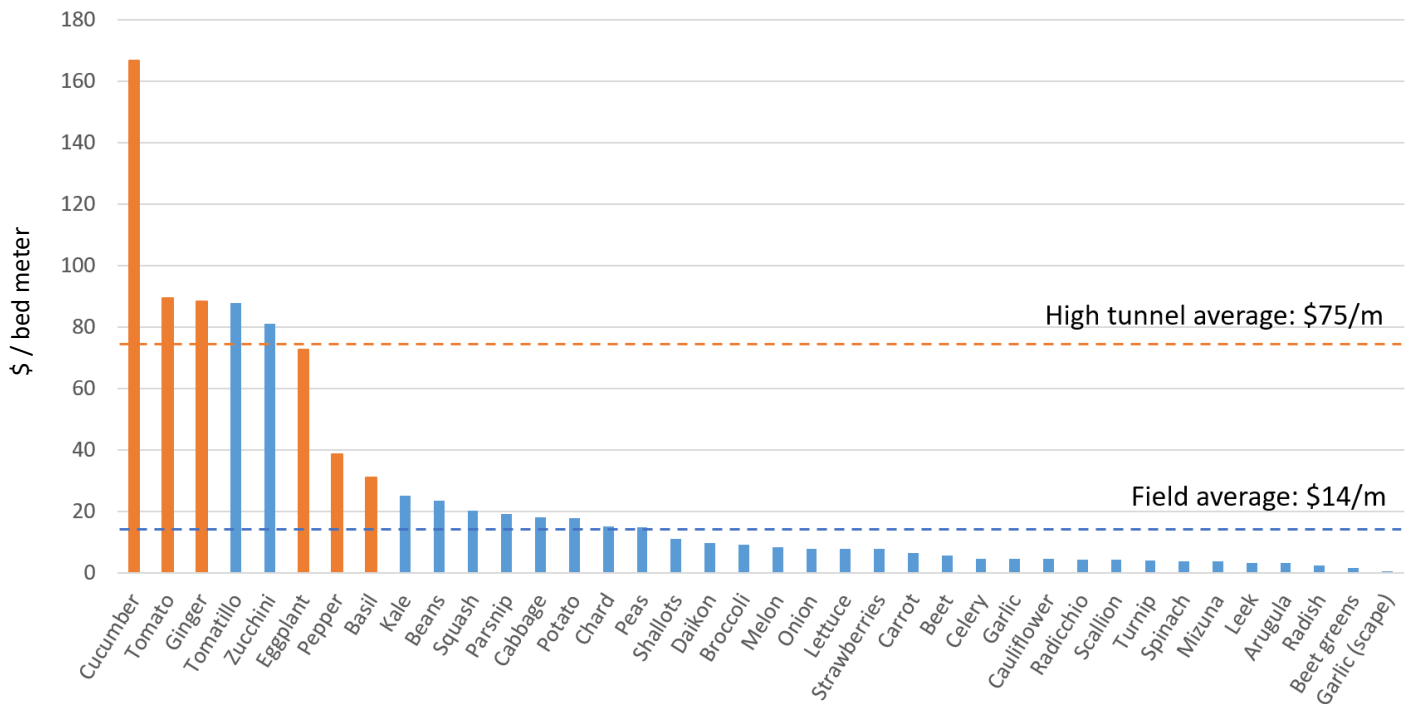
Crop Value



Crop yield by weight (left) and dollar value (right) from 2020 to 2022. Yield bars are divided to show 10 most productive crops. Value bars are divided to show distribution between direct-market sales, wholesale sales, and donations.



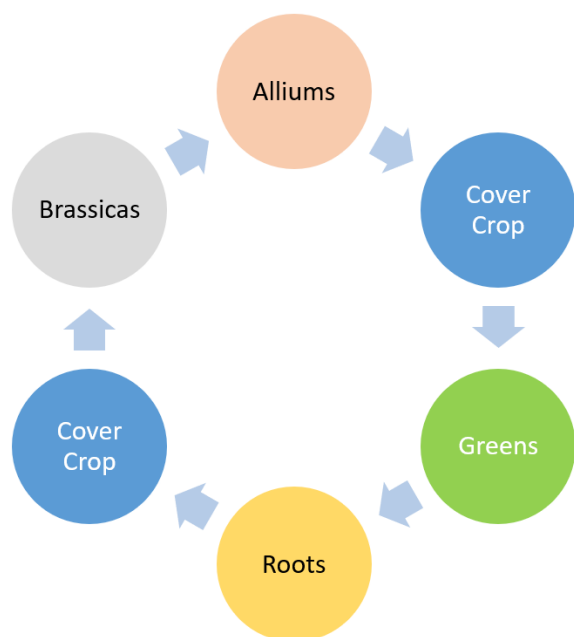
Small farm production types at the Garden City Lands include high tunnels (left, 20 m beds); market gardens (center, 30 m beds); and field crops (right, 100 m beds) zones. Larger-scale systems tend to be less labour intensive and are positioned further from the entrance hub in the southwest corner of the farm.



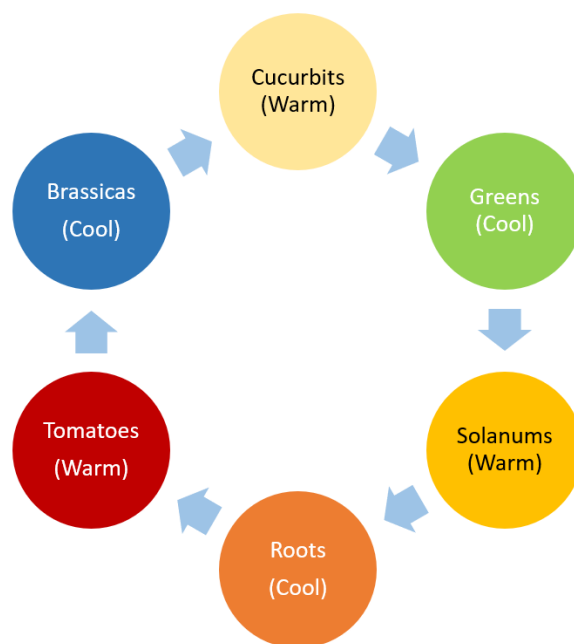
Farm income per bed meter by crop variety for 2022. Orange and blue bars denote warm season high tunnel and outdoor field beds, respectively. Orange and blue dashed lines show the average income per bed meter for high tunnel and outdoor field beds, respectively. The average income overall was \$24 per bed meter.

Annual crops are rotated to promote biodiversity on the farm; maintain and improve soil quality; and avoid build-up of soil-borne pests and disease.

6-year market garden rotation



9-year high tunnel rotation



The market garden rotation takes six years to complete. Soil-building summer cover crops make up one-third of the rotation. Winter cover crops are grown between each summer crop. Summer cash crops are grouped by crop type to allow six years before a closely related crop is grown on the same plot again. Cash crop groups are:

- Alliums—Storage onions, green onions, and shallots. Zucchini and celery are not alliums, but are grown in this plot too.
- Brassicas — Broccoli, cauliflower, turnip, radish, mizuna, and arugula.
- Greens — Lettuce, chard, spinach, and parsley.
- Roots — Carrots, beets, and leeks. Although leeks are alliums, they are grown with the root crops because their harvest involves significant soil disturbance.

The high tunnel rotation takes nine years to complete. Cash crops are grouped into three warm-season types and three cool season types. Warm and cool season cash crops are alternated, with soil-building cover crops grown between each cash crop.

Warm season high tunnel crops are among the highest-value crops we grow. They include:

- Cucumbers (with ginger planted in their shade, on the north side of the tunnel);
- Tomatoes;
- Peppers and eggplants (Solanums).

Cool season high tunnel crops use largely the same grouping as the market garden, but are grown in fall, winter, and spring when outdoor production is not feasible without protection. Cool season alliums are grown with the leafy greens.

Infrastructure

Solar Growing Dome

The solar dome greenhouse was built in October, 2018. Its primary purpose is early production of spring vegetable transplants while avoiding the greenhouse gas emissions normally associated with greenhouse heating systems.

Improvements to the dome in 2022 include:

- New ceiling exhaust fans powered by solar panels to allow for more effective temperature management.
- Installation of a new solar panel. This is a joint project with the Physics department at KPU. A student developed and installed a solar tracking panel that will provide power to the dome.
- Benches installed in the greenhouse to accommodate seedling production.



Stainless steel benches installed in dome to accommodate seedling production



Farm office constructed on site Feb. 2022.

Temporary Farm Office

A temporary site office was installed in Feb. 2022 to provide a secure building to house the farm office. The office provides critical capacity to secure computer equipment to allow for internet access, office space, climate controlled storage, and break spaces for the farm staff.

High Density Orchard Trellis

In November 2022, a trellis was installed to support a high density fruit tree planting. The first trees will be planted in Spring 2023. The orchard is located at the east end of the KPU Farm Phase I lease area.



Galvanized posts installed in November 2022 to support a high density fruit tree orchard.

Learning Garden

In January 2022, KPU provided funding to support the establishment of a Learning Garden at the KPU Farm for our local community. The KPU Farm Learning Garden was full of life in 2022 this year with several organized activities and many informal visits from community members!

Weekly Gardening & Life Skills Workshop with Richmond Center for Disabilities

In July and August, we partnered with the Richmond Center for Disabilities to provide community members with opportunities to participate in workshops in the garden exploring techniques and tasks associated with growing and enjoying plants!

Minoru Senior Society

The garden hosted a seniors outing and activity with the Minoru Seniors Society and Centre for Active Living. Participants explored the forms and functions of flowers, as well as techniques in Bouquet making.

The Pacific Immigrant Resources Society brought a group to the farm for a tour and discussion of agriculture . It was a wonderful opportunity to talk about foods from different cultures and introduce locally grown produce to new immigrants in our community.

Community Volunteer Program

We are currently accepting applications for the community volunteer program. Volunteers will grow food at the learning garden, assist with programing on site, and learn more about sustainable agriculture. Learn more, and apply to volunteer, at <https://www.kpu.ca/agriculture/kpu-farm-learning-garden>



The Learning Garden consists of 14 raised beds on the north side of the dome, and includes beds accessible to those who use wheel-



Visitors from the Richmond Center for Disabilities enjoy harvesting flowers and creating bouquets.

KPU Kids Camp

- KPU Farm hosted our first Kids Camp! This camp was a pilot project funded by KPU and welcomed 25 kids to the farm for a 2 day camp.
- Kids participated in a range of activities and learning on the farm including lessons about seeds and the stories they tell and different parts of the plant that our food comes from.
- Camp snacks were harvested from the learning garden and children were involved in the preparation of farm fresh treats like veggie wraps and sun tea!
- The camp was facilitated by KPU student leaders which provided an excellent opportunity for students to gain experience in teaching and engaging with children.

What's Next in the Learning Garden

- Expanding the garden to facilitate more outreach initiatives
- We will be hosting our second camp; a full weeklong engagement with children ages 10 to 12 at the end of July 2023.
- continuation and expansion of workshops with community groups like the Richmond Centre for Disabilities and senior's community services.



Biodiversity

- **Citizen Science.** Several community members have been engaged in monitoring and documenting the diversity of plants and animals they see at the KPU Farm and the Garden City Lands. iNaturalist is a publicly available app that provides a useful tool to engage with the community.
- **Invasive Species Management.** There are several invasive species that have been identified at the KPU Farm and require ongoing monitoring and management. Some of the key species include Reed Canarygrass (*Phalaris arundinacea*), Hedge Bindweed or Morning Glory (*Calystegia sepium*), Himalayan Blackberry (*Rubus bifrons*), and Canada Thistle (*Cirsium arvense*).
- **Beetle Banks.** Beetle banks are raised perennial planting zones that provide overwintering habitat for beetles as well as food and habitat for a variety of other beneficial insects. As part of an ongoing effort to increase perennial plantings, several Elderberry (*Sambucus*) plants were planted in the fall. Ongoing management of these plantings include adding compost, reseeding native wild flowers, and managing invasive species.
- **New Crops.** The KPU Farm is constantly trialing new crops that could be viable options for regional farmers. In 2022 we had a wonderful harvest of fresh ginger! This crop was grown in the high tunnels and provided a high value, low labour crop that was exciting to bring to the Kwantlen St. Market!



Screenshot from iNaturalist app. Points indicate location of entries on the site)



Students planting Elderberry in the beetle bank. June 2022.



Compost was added to all the beetle banks and reseeded to maintain diversity in the planting. These plantings are full of color and buzzing with activity all season and have been appreciated by photographers and community members!



Ginger harvest. September 2022.

Community Engagement

Farmers Market

Our program continued to sell our produce at the Kwantlen St. Market which occurs weekly on Tuesday afternoon (12-4 pm, April-November) in the Brighthouse Park lacrosse court, across from City Hall. The site allows control over how many people are admitted at once.

The market has been an important connection with community members seeking fresh locally-grown produce during the pandemic. Demand has been growing, and people are returning and asking for their favorite produce! We have developed a strong following of appreciative customers, facilitating many learning opportunities for both our students and community members.



Informal Conversations with Neighbours

As the community is increasingly using the trails on the Garden City Lands, there have been many conversations with neighbours about what is happening on the farm. There is a great deal of public interest in farm activities, leading to opportunities for impromptu tours and discussions. The learning garden attracted many people to come in and wander to appreciate the flowers and produce. Signage in the garden allowed for visitors to engage in learning at the farm.



The learning garden drew in many passers by to enjoy the flowers and produce.

Student Research Projects

Several students conducted experimental field studies in collaboration with community stakeholders at the Garden City Lands in 2022. This year's projects included research topics such as: sphagnum transplant, no-till vegetable production, and wire worm management. Research results are used to inform and improve our practices at the farm. Details of the student research projects, including those from previous years are available on our department website at <https://www.kpu.ca/agriculture/student-research/>



Student Benjamin Alles talks about his research project on no-till production systems with fellow students (June 2022)

Twilight Tours

The annual 'Twilight Tour' series occurring the second Tuesday of every month continued in 2022. These tours are open to the public and provide an opportunity for community members to engage with the space and learn about what is happening on the site. This year we had several members from the Community Garden on Garden City Lands come for a tour to learn about what we are doing.

Social Media

We have utilized social media extensively to share with the community about what is going on at the farm. Our students and staff contribute to the stories that we tell. This has been an important tool to let people know what we are about and what we are doing on the farm! Check us out at KPUAgriculture on Instagram and Facebook.

Community Fridge

There are several students in the KPU community that struggle with food insecurity. The students in the Sustainable Agriculture program collaborated with the Kwantlen Student Association to place a community fridge on campus to provide fellow students that are food insecure with fresh, healthy, local produce. Every week, the students take produce over and stock the fridge.

Campus Food

The KPU Farm continues to work with KPU to increase the amount of local produce that is used in our campus food service. We have worked with catering services to develop menus based on the produce that is available at the farm. This provides an opportunity to educate the chefs, our guests and to develop ongoing relationships with food services.

Sustainable Agriculture students stocking the Community fridge with produce grown at the KPU Farm at Garden City Lands.



Social media is a great way to share what is happening with our community.



Bog restoration

Most of the Garden City Lands is dedicated to peat bog restoration (see map on right). Peat soils represent a substantial carbon sink. They are usually formed by *Sphagnum* moss, which creates the uniquely acidic, anaerobic conditions that deter microbial decomposition, allowing carbon sequestered by photosynthesis to persist in peat for millennia.

Although the peat soils of the Garden City Lands demonstrate a history of *Sphagnum* growth, very little of *Sphagnum* is currently growing in the bog restoration area.

The Garden City Lands bog has been mowed annually to prevent growth of tall invasive species, such as European birch (*Betula pendula*), which dominates much of the neighbouring land owned by the Department of National Defense.

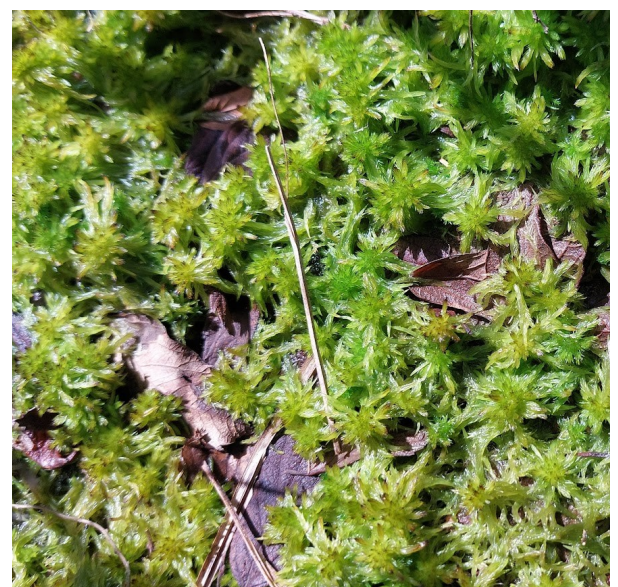


Peat bog restoration is the dominant land use on the Garden City Lands.

Mowed vs. unmowed study

A study was initiated in 2019 to determine the impact of mowing on *Sphagnum* at the Garden City Lands. City Parks staff, KPU faculty, and members of the Garden City Conservation Society worked together to stake off an area of the bog where *Sphagnum* was growing. Contractors were asked not to mow the staked area, which was divided into 24 plots, each measuring 6 x 6 m. Twelve randomly selected plots have been mowed annually when the rest of the site is mowed in the fall, and the remaining twelve plots have been left unmowed.

When KPU student researcher, Rue Badanic, measured *Sphagnum* cover in the experimental plots in 2022, *Sphagnum*



Sphagnum moss growing at the Garden City Lands.

covered more than 20% of the soil surface in the unmowed plots, but less than 5% in the mowed plots. Invasive European birch had not established in the wet soils where *Sphagnum* was found. Based on these findings, a recommendation was made to City Parks to leave a large wet area with low birch pressure unmowed in 2022. More selective mowing is expected to facilitate *Sphagnum* regeneration.

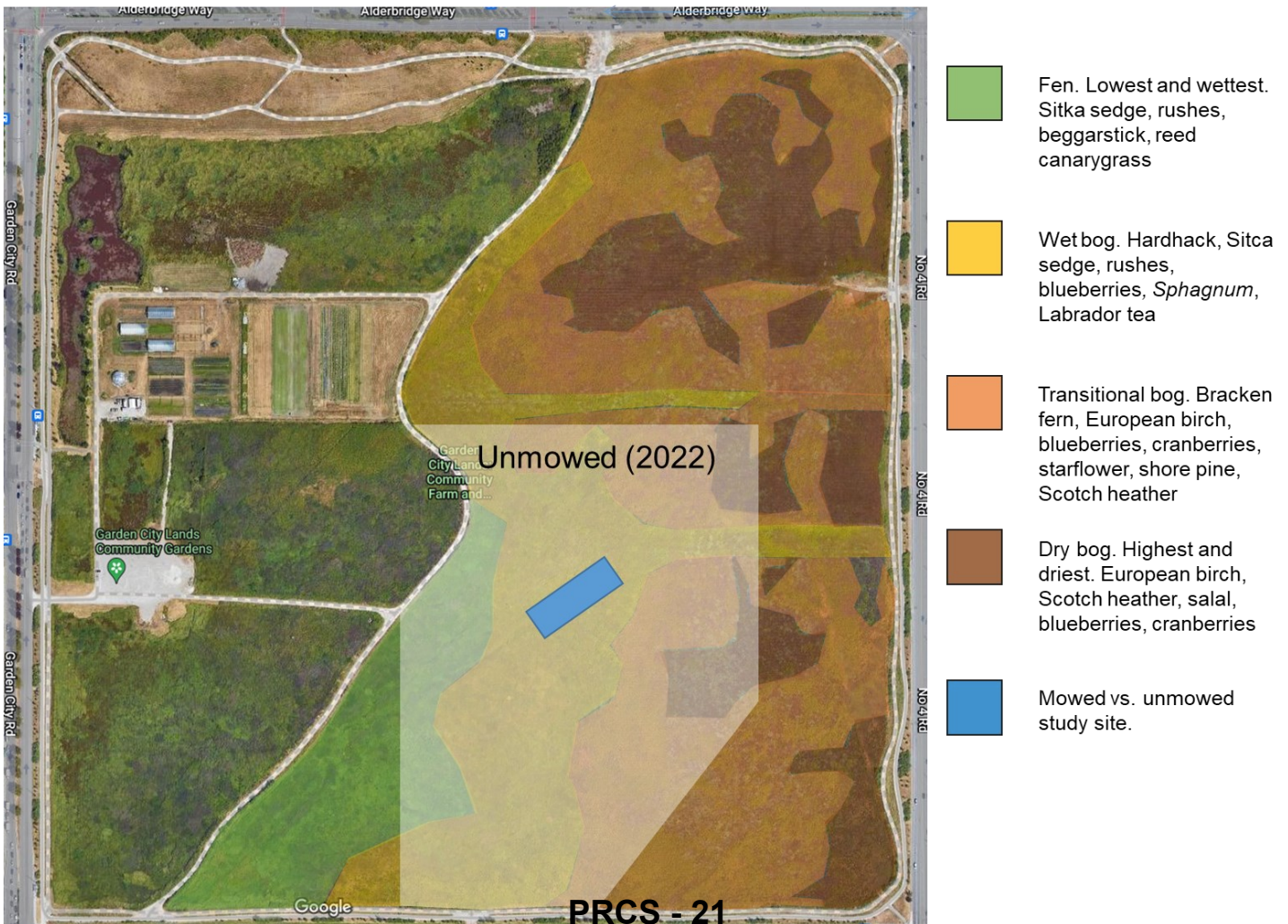
Sphagnum transplanting

Sphagnum was found growing in an area west of the dyke, slated to be filled with a layer of clean mineral soil to address contamination concerns. KPU and the Garden City Conservation Society coordinated a community transplanting event in May, 2022 to move small patches of *Sphagnum* to suitable locations in the bog restoration zone on the east side of the dyke.

KPU conducted larger-scale *Sphagnum* transplanting efforts with tractor-mounted front-end loaders in October and November.



Dr. Michael Bomford shows *Sphagnum* surviving in an unmowed plot (background) while dessicating in a mowed plot (foreground), September 6th, 2022.





A front-end loader scoop of *Sphagnum*-rich plants in peat is brought across the dyke for transplanting into the bog restoration zone of the Garden City Lands. October 28, 2022.

***Sphagnum* propagation**

Sphagnum propagators were constructed on the KPU Farm to provide an ongoing supply of moss for transplanting into the bog restoration area. Each propagator is a large Styrofoam float tray with 500 peat plugs. A piece of *Sphagnum* is placed on each plug to grow. Four propagators have been constructed so far. They have been planted by students and community members. Various locations are being tested around the farm to identify the most suitable environments for *Sphagnum* growth.



Students work next to *Sphagnum* propagators floating on the pond in the solar dome greenhouse.



A [video](#) produced by the Garden City Conservation Society documents community *Sphagnum* transplanting and propagation events at the Garden City Lands.

Farm expansion and Next Steps

Barn Update

KPU was going through the planning process to build a barn at the KPU Farm at Garden City Lands to provide storage for equipment, a permanent office, and covered processing areas. This project had to be suspended and will not be moving forward at this time. KPU is currently exploring options to address the challenges associated with not having a structure on the site.

North Field Expansion

A five hectare expansion of the farm is planned for the northern section of the license area. Clean peat excavated from a greenhouse construction project on No. 5 Road was spread over the existing peat to address contamination concerns. This peat was then topped with mineral soil and topsoil excavated from the Polygon development being constructed at the junction of Cambie and Garden City Roads. The mineral soil from this site was not sufficient to cover the area, so additional soil will be needed. Drains will again be positioned above the peat. If successful, this strategy will enable preservation of the sequestered carbon in both the native peat and the imported peat, avoiding substantial greenhouse gas emissions. Although the site is not yet ready for production, we have planted a cover crop on the soil that has been placed to minimize soil erosion, weed pressure and increase organic matter.

KPU will continue to develop a master plan for the site in collaboration with the City of Richmond to ensure the expansion into the north field is cohesive and consistent with the vision for the Garden City Lands.

The current plan is to emphasize public engagement with a food forest at the site entrance across from May Drive, and along the west edge of the dike. A triangle west of the food forest will be used to experiment with paludiculture, which couples peat conservation with agricultural production. The remaining land will be used for field crop production.



Peat windrows piled at the edge of the north field expansion area waiting to be spread across the north field. Feb. 2023

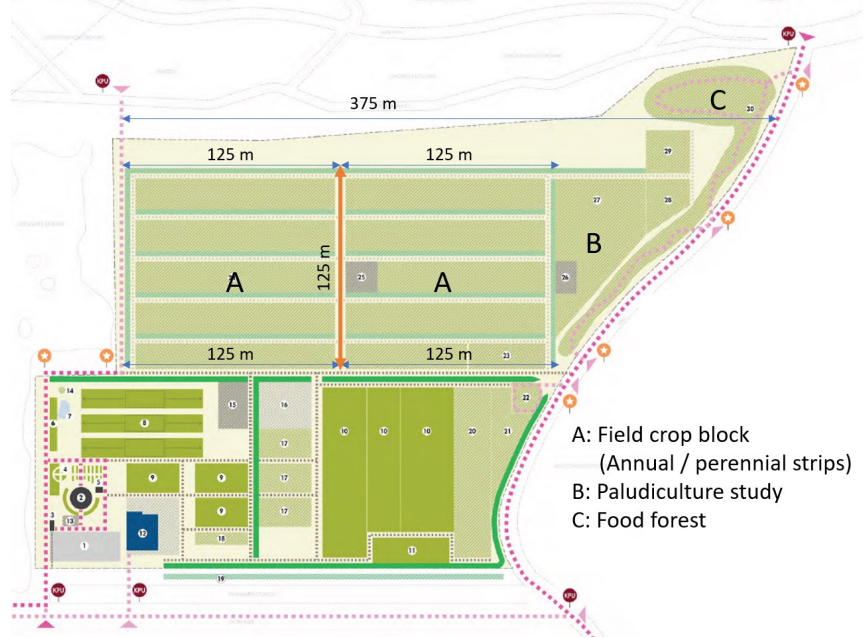


Equipment working at the site to screen the imported material prior to spreading across the site to ensure optimal quality. Sept. 2024

Farm expansion and Next Steps

Storage Structure

KPU is currently working with the City of Richmond to find options to address the immediate need for a storage structure on site. This structure will allow the KPU Farm to store equipment and materials securely while ensuring the site is maintained in an organized manner. In addition to the storage structure, KPU will continue with a site master plan in collaboration with the City of Richmond to ensure a cohesive and aesthetically pleasing site is developed.



Expansion of the Learning Garden

We had an excellent response from the community around the Learning Garden and the Kids Camp. In order to increase our capacity to engage with the community at the site, we will be expanding the learning garden and developing signage around the site to provide visitors with more information about the crops we grow, the production systems used and research carried out. We are very excited about the many community partners that have come along side us in this process and we are looking forward to providing our community with rich, experiential learning opportunities!

