INTERNATIONAL RESCUE COMMITTEE

JUNE 2024

Cultivating Youth Food Justice Programs

A Toolkit for Youth-Led Food & Agriculture Programs

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Introduction

The International Rescue Committee (IRC) supports refugees, asylum seekers, and other newcomers to resettle and connect with their new communities in 29 cities across the United States. For over 15 years, this work has included gardening, farming, and food entrepreneurship with adults and youth as part of a national initiative called "New Roots."

Refugee and immigrant youth face many challenges as they learn to navigate life in the United States. Many have experienced trauma and interrupted education, and they must learn to adapt quickly while they are also trying to learn English and new cultural norms. Their families are often housed in low-income neighborhoods which suffer from various challenges related to structural inequality. Among refugee children (ages 2-19), changes in diet and eating habits after resettlement often result in a rapid increase in obesity rates. A 2014 study shows obesity levels among refugee children increasing after only three years from 17.3% at arrival to over 35%, which is higher than the national average.[1] These problems have only become more pronounced with the COVID-19 pandemic[2] and are compounded by a simultaneous steep rise in the overall cost of living.

The IRC has identified food insecurity and school food quality as major daily challenges for newcomer youth. Food access and food justice are issues that shape the experiences of refugee and immigrant youth on a daily basis, as many newly-arriving families are resettling into low-income areas that are experiencing food apartheid. Students have shared that school food is not fresh, does not reflect their cultures, and often is not palatable. School administrators and teachers have also expressed concern over the school food environment and educational offerings.

For those students who may have experienced trauma or interrupted education and are forced to learn a new culture and language, outdoor supportive learning settings create a nurturing and supportive

[1] Heney, J.H., Dimock, C.C., Friedman, J.F., & Lewis, C. (2014). Pediatric refugees in Rhode Island: Increases in BMI percentile, overweight and obesity following resettlement. *Rhode Island Medical Journal, 98,* 43–47.

[2] Rifas-Shiman, S.L., Aris, I.M., Bailey, C., Daley, M.F., Heerman, W.J., Janicke, D.M., Lin, P.D., Petimar, J., & Block, J.P. (2022). Changes in obesity and BMI among children and adolescents with selected chronic conditions during the COVID-19 pandemic. *Obesity 30(10),* 1932-1937. https://doi.org/10.1002/oby.23532

environment and community that benefits academic achievement[3], social emotional regulation[4], cognitive functioning, and physical health[5]. A recent systematic review[6] looked at 147 research studies and concluded that "nature-specific outdoor learning has measurable socio-emotional, academic and wellbeing benefits."

In response, the IRC developed the New Roots "Youth Food Justice" program in partnership with newcomer schools, focusing mostly on high school age children and engaging them as "service learners" and leaders in addressing their community food needs. New Roots Youth Food Justice programs use a strengths-based approach that is culturally respectful, developmentally appropriate, oriented toward service-learning, and focused on positive skill building. While refugee and immigrant youth face many challenges, they bring with them true stories of survival and resilience. Land- and food-based education techniques provide a relevant platform for newcomer youth to nurture and celebrate their diversity and serve as a launching pad for their learning and leadership development.

In 2022, through a grant from USDA's Farm to School (F2S) program, IRC New Roots implemented the **Empower Advocate Together (EAT) Local Food Project** in Oakland, California; Atlanta, Georgia; Salt Lake City, Utah; and Tukwila, Washington. The project worked to improve access to healthy local food in eight schools and one 4H program by involving newcomer youth and their peers in local food systems and in garden- and culinary-based learning opportunities. School districts in the project areas are low-income, with 95% of students being eligible for free or reduced-price lunches. All four of the target locations are designated by the United States Department of Agriculture (USDA) as food deserts, meaning that many obstacles exist to accessing fresh, healthy, and affordable foods.

EAT Project activities:

- centered food justice and youth leadership

[3] American Institutes for Research. (2005). Effects of Outdoor Education Programs for Children in California. https://www.air.org/resource/report/effects-outdoor-education-programs-children-california

[4] Beyer, K., Bizub, J., Szabo, A., Heller, B., Kistner, A., Shawgo, E., & Zetts, C. (2015). Development and validation of the attitudes toward outdoor play scales for children. *Social Science and Medicine, 133,* 253-60. https://doi.org/10.1016/j.socscimed.2014.10.033

[5] Charles, C., & Senauer, A. (2017). Children's contact with the outdoors and nature: A focus on educators and educational settings. Children & Nature Network. https://www.education.ne.gov/wp-content/uploads/2017/07/ChildrensContactOutdoorsNature.pdf

[6] Mann, J., Gray, T., Truong, S., Brymer, E., Passy, R., Ho, S., Sahlberg, P., Ward, K., Bentsen, P., Curry, C., & Cowper, R. Getting out of the classroom and into nature: A systematic review of nature-specific outdoor learning on school children's learning and development. (2022). *Frontiers in Public Health, 10.* https://doi.org/10.3389/fpubh.2022.877058

- catalyzed food and agriculture to support students' overall well-being and integration in their new school environments
- increased fruit and vegetable consumption through school gardens, culinary and community wellness events, and free food distributions at school-based community hubs
- trained and supported local BIPOC food producers to supply culturally appropriate produce to schools

The project also developed an integrated set of tools to support the above activities in this project and beyond.

Core Components of the Toolkit

Implementing the EAT Project has been an educational experience for program facilitators as well as youth participants. The EAT Project provided an opportunity to refine tested curricula, building on over a decade of experience from IRC Youth Food Justice leaders and practitioners. In particular, the IRC sought to capture the ways these Youth Food Justice programs support key social emotional assets and create a safe and nurturing environment for students to learn transferable skills, improve their English, and build community around food access.

In addition to the Youth Food Justice lesson plans, this toolkit highlights best practices from two innovative New Roots pilot projects that sought to build community connections and improve access to healthy, locally-grown foods. In Tukwila, Washington, The EAT Project piloted a youth-centered participatory action research (YPAR) project, using the PhotoVoice method, as a way to empower youth to experience their own food system as co-researchers with space to develop localized solutions. This experience fostered youth leadership development through the practice of data gathering and analysis and the opportunity to elevate their voices in their communities. A case study report from this research project was compiled for this toolkit.

Finally, the Farm-to-School Procurement Handbook presents resources and best practices drawn from the experiences of the New Roots team in Salt Lake City, Utah, as they worked to shift local school cafeteria food procurement to source from local BIPOC farmers. New Roots SLC is a farm incubator program that supports refugee farmers in establishing farm businesses and accessing local markets, including farm-to-school sales. The Farm-to-School Procurement Handbook offers insights and resources to help navigate the complexities of establishing a new school food procurement program that builds local food systems

and promotes economic empowerment for refugee farmers.

The Youth Food Justice and New Roots teams hope that the insights gained through this work can help inform future projects in other communities.

How This Toolkit Was Developed

Each New Roots Youth Food Justice program was uniquely built around the needs and interests of the students, teachers, and the resources available. Over several years, different lesson plans were adapted for various contexts. This iterative process of lesson development and adaptation yielded over a dozen lesson plans which span topics focused on urban gardening techniques, transferable professional skills, cooking, nutrition, applied science topics, and food justice issues and solutions. Central to the lesson plans are teaching approaches honed to the unique needs of youth with refugee and immigrant backgrounds:

1. Experiential education approaches: Youth Food Justice leaders work closely with schoolteachers to develop lesson plans that help to complement and reinforce standard curricula. Youth Food Justice lessons are largely based on hands-on activities that help to break down more complex ideas with which students may be struggling in the classroom. This technique can reduce anxiety and stress while enhancing knowledge retention, especially when an experience is paired with reflection and thinking about applications. A primary tool in garden- and culinary-based teaching is the use of "realia" – essentially real, concrete objects that help build knowledge and provide a multi-sensory experience. Getting into the garden or kitchen and practicing with the "real thing" is one of the most effective teaching techniques for audiences with limited or no formal educational background, who are simultaneously working to clear language and literacy hurdles.

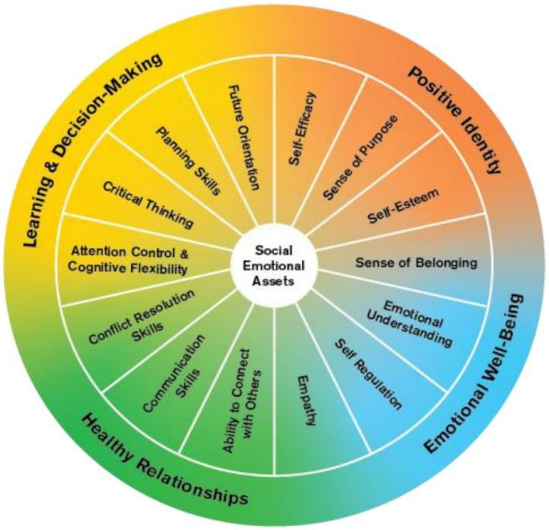
2. Trauma-informed approaches to teaching: Trauma-informed approaches prepare teachers to recognize and respond to those who have been impacted by traumatic stress. Teachers create environments where all students feel safe–physically, emotionally, academically and socially–and they foster positive connections to school.[7] Refugees, asylees, and others affected by forced migration

[7] Cole, S.F., Eisner, A., Gregory, M., & Ristuccia, J. (2013). *Helping traumatized children learn: Creating and advocating for trauma-sensitive schools.* Massachusetts Advocates for Children. https://traumasensitiveschools.org/wp-content/uploads/2013/11/HTCL-Vol-2-Creating-and-Advocating-for-TSS.pdf

often have high rates of exposure to trauma[8]. An ideal framework provides refugee and immigrant students with: 1) an environment designed to promote a foundational culture of peace, critical care, and pro-social behavior, and 2) the tools, systems, and resources necessary to cope with adverse reactions[9].

3. Social Emotional Asset Development (SEAD): Social emotional development is widely recognized as a critical aspect of human development that helps increase resilience in individuals, which in turn helps to improve every aspect of life. Social Emotional Asset Development (SEAD) is the process by which people gain and strengthen their internal and external resources and practices to support their well-being. While many aspects of social emotional asset development are common to youth across the world, the IRC has identified a number of themes and issues that are particularly salient for young people who have been displaced. The diagram below illustrates the social emotional assets that IRC youth programs seek to develop in youth affected by forced migration[10].

IRC Social Emotional Assets for Youth Affected by Forced Migration



Source: Rowbottom, S. (2020). Critical factors affecting social emotional development for youth affected by forced migration: Rationale for a guiding framework [Internally published report]. International Rescue Committee, p. 25

[8] Knipscheer, J.W., Sleijpen, M., Mooren, T., ter Heide, F.J., & van der Aa N. (2015). Trauma exposure and refugee status as predictors of mental health outcomes in treatment-seeking refugees. *BJPsych Bulletin, 39(4),* 178-82. https://doi.org/10.1192/pb.bp.114.047951

[9] Rowbottom, S., Arndt, R., Curran, P., Cauchois, B., Penzin, M. (2021). Newcomer youth summer academy systems of support: culture and climate contributors [Internally published report]. International Rescue Committee.

[10] Rowbottom, S. (2020). Critical factors affecting social emotional development for youth affected by forced migration: Rationale for a guiding framework [Internally published report]. International Rescue Committee.

The EAT Project provided an opportunity for Youth Food Justice staff to build the knowledge and skills to design and implement curricula that support social emotional asset development for youth of diverse, multilingual backgrounds. Through the process of curricula development, staff integrated SEAD activities as complimentary parts of lessons. Youth Food Justice lesson plans have a particular focus on developing **self-efficacy**, **critical thinking**, and **communication skills** among youth.

Who This Toolkit is For

This toolkit is provided to assist service providers who would like to start or enhance a Farm to School-funded or -inspired program specifically working with refugee and immigrant youth. It was designed, adapted, and piloted by IRC staff working with refugee and immigrant youth in Oakland, California; Atlanta, Georgia; Tukwila, Washington; and Salt Lake City, Utah.

How to Use This Toolkit

The toolkit is divided into the following sections:

- Youth Food Justice Lesson Plans
    - Lesson Plans from Atlanta, Georgia
        - Maintaining a Healthy Garden
        - Biodiversity in the Garden
        - Healthy Foods
    - Lesson Plans from Oakland, California
        - Garden (Re)Design
        - Cooking from the Garden
- Lessons Learned from Pilot Programs
    - Youth Food Justice Leaders Internship
    - Farm-to-School Procurement Handbook

The lessons selected for the Youth Food Justice curriculum are meant to be adapted to the context in which they will be implemented. This may include considerations such as time, seasonality, land access, and number of students per cohort. Lesson plans provide facilitation scripts, key materials, and suggested lesson extensions to help facilitators quickly understand the materials. The lessons can be used in the suggested sequence or adapted for the length or scope of a local program. Most can be taught as stand-alone lessons.

Lesson Title	Topics
Planting a Community Garden	Food Justice Food Systems Garden Care Practical Skills Building Community
Weeding and Mulching	Garden Care Practical Skills
Soil Types	Garden Care Science
Soil Nutrients	Garden Care Practical Skills Science
Insects and Pest Control	Garden Care Practical Skills Science
Garden Pollinators	Garden Care Science Biodiversity
Healthy Garden Ecosystems	Science Biodiversity
Biodiversity and Monocropping	Science Biodiversity Food Systems
Exploring Companion Planting	Science Biodiversity Practical Skills Garden Care
Post-Harvest Handling	Garden Care Cooking Health & Nutrition Practical Skills
What's in a Nutrition Facts Label?	Cooking Health & Nutrition
Garden (Re)Design: Field Annotations & Observations	Building Community Food Justice Planning & Designing
Garden (Re)Design: Turning Ideas Into Reality	Planning & Designing Practical Skills
Garden (Re)Design: Tool Demonstration & Practice	Planning & Designing Practical Skills
Garden (Re)Design: Action	Planning & Designing Practical Skills
Garden (Re)Design: Community Celebration	Building Community Food Justice
Writing Recipes	Cooking Building Community Practical Skills
Cooking Together	Cooking Building Community Practical Skills

About the Authors

Olive Bartholomew is a Food Access & Youth Education Program Specialist for the International Rescue Committee in Oakland, California, where they work at two newcomer high schools and oversee the IRC Oakland office food pantry. Olive has over six years of experience with sustainable farming and gardening, garden education, and environmental justice work. Olive has worked in urban farms and school gardens with students ranging the K-12 spectrum for the past three years. They are passionate about connecting young people to their local food systems and empowering students to share their outdoor and cooking skills and knowledge with each other.

Ash Dawson is the New Roots Program Coordinator at the International Rescue Committee's office in Atlanta, Georgia. With a background in anthropology, Ash has dedicated over six years to urban agriculture and empowers newly arrived American farmers and gardens through agriculture and nutrition education. Her focus includes enhancing community access to fresh, culturally relevant foods; promoting food justice and sovereignty; and developing transferable job skills. Throughout her career, Ash has been committed to providing educational resources to refugee and immigrant farmers and gardeners in the vibrant community of Clarkston, Georgia.

Christina Gonzalez is the Youth Roots Assistant at the International Rescue Committee's office in Seattle. With over 15 years of experience in the health and fitness industry, Christina developed a deep appreciation for the impact of nutrition on overall well-being. This led her to explore the origins of the food we consume, eventually driving her to pursue a career in which she could affect systemic change in equity to land and food access. Christina educates and encourages youth to advocate for food justice within underserved communities.

Eugenia Gusev is a Senior Technical Advisor at the International Rescue Committee, focused on food security and agriculture. Eugenia has 14 years of international project management and evaluation experience (France, Russia, and the US, with field experience in Kyrgyzstan, Mali, Niger, DRC, Cote d'Ivoire). For the last seven years she has been focusing on food systems work and refugee resettlement in the United States. She has led several federally- and privately-funded projects focused on improving food security, nutrition, and community cohesion for refugees and their communities. She is also the project director for several evaluations which use Participatory Action Research methods.

Anna Hickman is a Food Access & Youth Education Program Specialist at the International Rescue Committee's office in Oakland, California. Anna began her work in food access over eight years ago, and she has been involved in a variety of opportunities across the US South and the West Coast at the intersections of food systems, communities, policy, and agriculture. For the last few years, Anna has worked with youth and young adults, focusing on nutrition education, increasing access to culturally-relevant foods, and promoting youth sovereignty in affecting change.

Xavier Wurttele-Brissolesi is a Youth Roots Coordinator at the International Rescue Committee's office in Seattle, Washington. Xavier has studied and worked in sustainable food systems and food rights for over seven years. He has played many roles supporting refugee and immigrant populations to access farmland and farmers markets. In recent years, he has been teaching high school youth about the food and climate justice issues that we face. Xavier is committed to supporting youth to become the next generation of leaders that will advocate for food and climate rights.

Sierra Govett is the New Roots Program Manager at the International Rescue Committee's office in Salt Lake City, where she oversees the New Roots SLC program. She has over a decade of experience in project management, food systems, and sustainable agriculture. For the past five years, she has worked closely with refugee and New American growers, developing accessible agriculture programming, overseeing site expansion, and providing agricultural training and technical assistance to socially disadvantaged groups. Sierra is passionate about improving the local food system and reducing food insecurity in Salt Lake City and empowering refugee and new American growers to successfully grow their own food, start farm businesses, and build the skills needed to succeed in their goals.

Acknowledgments

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- New Roots Salt Lake City expresses thanks to Utah Farm to Fork and the Jordan School District for their invaluable support and cooperation.

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Part 3: Lessons Learned from Pilot Programs

- Youth Food Justice Leaders Internship
- Farm-to-School Procurement Handbook

Lesson Structure

Each Farm to School lesson is structured the same way. You can use this lesson structure to adapt the lessons you lead with your youth gardeners.

- **Lesson Time:** Each step in the lesson has an estimated time. The total time is listed at the top.
- **Description:** This is a brief one-sentence summary of what the lesson covers.
- **Learning Objectives:** These statements describe the skills that learners will build by the end of the lesson.
- **Word Bank:** This is a list of vocabulary words that learners will use during the lesson. Depending on learners' level of familiarity with English-language vocabulary related to gardening and environmental science, it may be helpful to review these words at the beginning of the lesson.
- **Materials:** This is a list of materials needed for the lesson. Gather them ahead of time.
- **Preparation:** This includes all the steps required to prepare for the lesson. Some steps may need to be completed ahead of time.
- **Activity Breakdown:** This section explains all the activities to be completed during the lesson, with a breakdown of time needed for each step.
- **Adaptations:** These are optional ideas for extending or adapting the lesson to fit different circumstances or different timeframes.
- **Resources:** If there are additional resources or links to related information, they will be listed at the end of the lesson.

Maintaining a Healthy Garden

ATLANTA, GEORGIA

The lessons in this module are designed to cultivate an understanding of sustainable food practices, and to develop hands-on experience in agriculture and nutrition. Learners will foster transferable skills in teamwork, leadership, critical thinking, and project management.

The module includes 11 lessons:

Maintaining a Healthy Garden

- Planting a Community Garden
- Weeding & Mulching
- Soil Types
- Soil Nutrients
- Insects & Pest Control

Biodiversity in the Garden

- Garden Pollinators
- Healthy Garden Ecosystems
- Biodiversity & Monocropping
- Exploring Companion Planting

Healthy Foods

- Post-Harvest Handling
- What's in a Nutrition Facts Label?

This module was designed and tested by Ash Dawson in Atlanta, Georgia.

How to use this curriculum module:

This module has been successfully implemented for nine years as an after-school and summer Youth Food Justice Leadership internship with high school age youth in Atlanta, Georgia. Throughout the series, we emphasize transferable skills and food access. Youth not only gain access to fresh foods, including culturally relevant crops, but also develop transferable skills for personal and professional growth. Participants acquire hands-on experience in agriculture and nutrition, fostering skills such as teamwork, leadership, problem-solving, and project management. Engaging with diverse crops cultivates an understanding of sustainable food practices and enhances critical thinking abilities. This unique opportunity not only promotes food access, but also equips youth with valuable skills that can be applied across various domains, preparing them for future success.

Timing and schedule

Working closely with school administration is key to finding and adapting the right pace and schedule. This lesson plan series is taught as an after-school and summer internship in the spring, fall, and summer sessions. During the spring and fall, it is taught over six to eight weeks with eight to ten students meeting once a week for approximately three hours. In the summer, the curriculum spans eight to nine weeks with two to three meetings per week, each lasting two to three hours, and includes field trips aligned with specific lessons. Possible adaptations for this design could include virtual delivery, extended duration, small group focus, blended learning approaches, and further exploration of different thematic areas to cater to diverse interests.

Internship stipends

When planning for internship stipends, ensure participants receive the designated amounts

through checks or prepaid gift cards. It is essential to consult with each participant to determine their preferred payment method. For gift card purchases, consider buying online or from secure locations where the cards are kept behind the counter to prevent potential compromises.

MODULE: MAINTAINING A HEALTHY GARDEN

Planting a Community Garden

90 minutes

This lesson plan introduces students to the basics of maintaining a healthy garden, including plant selection, planting seeds, and watering, empowering students to actively engage in gardening while emphasizing the importance of maintaining a thriving garden ecosystem. This lesson also highlights "guerrilla gardening"—a community-building activity aimed at addressing food insecurity and improving well-being in urban communities.

Learning Objectives

Learners will be able to…

- Practice mindfulness in the garden
- Select plants for gardening
- Plant seeds with appropriate spacing
- Give plants a healthy amount of water
- Gain awareness about the benefits of community gardening

MATERIALS

- ☐ Presentation materials (projector, whiteboard)
- ☐ Gardening tools (gloves, trowels, watering cans, etc.)
- ☐ Seeds or seedlings
- ☐ Soil
- ☐ Seed packets

Word Bank

Climate: the usual weather conditions of a place, such as its temperature, humidity, and rainfall

Seedlings: young plants that grew from seeds

Spacing: the distance needed between plants to give them room to grow

Overwatering: giving plants too much water, which can be bad for their growth

Underwatering: not giving plants enough water, which can cause them to dry out and die

Organic: without harmful chemicals; made up of dead plants or animals that were once alive

Urban: in a city or town

Preparation

- ✓ Get garden beds (or pots) ready for students to plant seeds.
- ✓ Purchase seed packets (or seedlings) that are appropriate to plant in the current season.

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Have students write down what they see, hear, smell, and feel.

Community Gardens (20 minutes)

- Begin by discussing the importance of gardening and its benefits, such as providing fresh food, improving mental well-being, and connecting with nature. Explain the objectives of the lesson. (5 minutes)

- Show pictures of vibrant, healthy gardens and people engaging in gardening activities to illustrate the benefits and appeal of gardening. Explain that gardens come in all shapes and sizes and that each garden is unique in its own way, just like people. (5 minutes)
- Show the video Ron Finley: Urban Gangsta Gardner in South Central LA (5 minutes, created by WMX Presents). This video highlights a specific style of gardening done in urban cities and introduces the concept of community gardens, as well as food justice service projects.
    - Ask students to share their thoughts on the Ron Finley video. (5 minutes)
        - What did you like about the video?
        - What are the benefits of having a community garden?
        - Why did Ron Finley want to build a garden in his community?

Plant Care (30 minutes)

- Discuss the factors to consider when choosing plants for a garden, such as climate, sunlight, and available space. (5 minutes)
- Introduce some beginner-friendly plants that are easy to grow and maintain, such as herbs, leafy greens, or cherry tomatoes. (5 minutes)
- Pass out seed packets to students. Have the students read the information on each packet. Ask:
    - What is the name of the plant?
    - What does the picture show? How does the plant look?
    - How much sun does the plant need? Does it need full sun, partial sunlight, or shade?
    - Is there any information about the plant's water needs? How often should it be watered?
    - How deep should we plant the seed? How much space is needed between plants? How big will the plant grow?
    - How long will it take for the plant to grow? What season should it be planted in? When will it be ready to harvest?
- Show pictures of gardens with various types of plants and crops. Point out that there is intentional spacing between each plant. Explain the proper techniques for planting seeds or seedlings, including depth and spacing. Refer back to the information provided on the seed packets. (5 minutes)
- Show the video How to Water Plants Effectively (3 minutes, created by RealSimple). Ask students what they learned about watering plants from watching the video. Demonstrate how to water plants effectively, emphasizing the importance of not overwatering or underwatering.

Hands-on Activity: Planting Seeds (20 minutes)

- Divide students into small groups of 4-5. Provide each group with soil, pots or garden beds, seeds, and gardening tools.
- Instruct students to plant the seeds according to the guidelines discussed earlier. (Use seeds that are appropriate for planting in your region given the current season.)
    - Ideally, the seeds should be planted outdoors, in the ground. If the students plant the seeds in pots indoors, have them place the pots somewhere where they can safely monitor their growth and where the plants will receive the appropriate amount of sunlight.
- Guide the students in watering the seeds properly.

Conclusion and Reflection (10 minutes)

- Recap the key points covered in the lesson.
- Ask students to share their thoughts and experiences from the hands-on activity. Ask them to predict how long it will take for their seeds to grow.
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Mindfulness

Gardening provides opportunities for students to practice mindfulness by being present in the moment, observing plant growth, and tending to the needs of their garden. It encourages them to slow down, focus on the task at hand, and develop a sense of calm and relaxation.

Resources

How to Water Plants: 7 Tips to Keep Plants Thriving (web article by RealSimple.com)

Ron Finley: Urban Gangsta Gardner in South Central LA (5-minute video by WMX Presents, available on YouTube).

How to Water Plants Effectively (3-minute video by BBC Gardeners' World Magazine, available on YouTube).

Garden Design is a good source of images of different types of gardens to print.

MODULE: MAINTAINING A HEALTHY GARDEN

Weeding and Mulching

55 minutes

This lesson plan introduces students to the basics of maintaining a healthy garden, with a focus on weeding and mulching. Hands-on activities empower students to actively engage in gardening while emphasizing the importance of maintaining a thriving garden ecosystem.

Learning Objectives

Learners will be able to…

- Identify common weeds
- Explain the impact of weeds on garden health
- Explain the purpose of mulching in a garden
- Demonstrate effective weeding and mulching techniques

MATERIALS

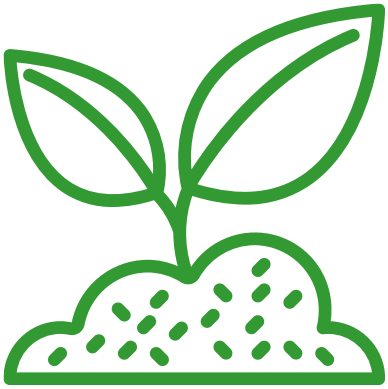
- ☐ Gardening tools (gloves, trowels, hand forks)
- ☐ Mulch materials (wood chips, straw, compost, or shredded leaves)

Word Bank

Weeds: plants that grow where we don't want them

Mulch: wood chips, straw, dried leaves, or other material placed around plants to keep the soil healthy and stop weeds from growing

Organic: without harmful chemicals; made up of dead plants or animals that were once alive



Preparation

- ✓ Decide which areas of the garden need mulch.
- ✓ Purchase mulch materials (straw, wood chips, shredded leaves, etc.) at your local garden store.

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask students to notice everything that is growing in the garden. Have students write down what they see, hear, smell, and feel.

Classroom Learning: Weeding and Mulching (15 minutes)

- Ask students what they noticed in the garden today. Is there anything growing in the garden that we didn't plant on purpose?
- Explain the concept of weeds and the purpose of mulching using simple language, illustrated by pictures to help students understand. (10 minutes)
    - Weeds are plants that grow where we don't want them to. They can take food and water away from the plants we want to grow.
        - Show pictures of common weeds from this article in The Spruce or from your own favorite sources.
    - Mulching is like putting a blanket around plants. It helps keep the soil nice and cozy and stops weeds from growing. Different types of mulch include wood chips, dried leaves, grass clippings, straw, bark, gravel, pine needles, newspaper, sawdust, cardboard, etc.
        - Show pictures of different types of mulch from this article in The Spruce or from your own favorite sources.
        - If you have time, show the video Best Mulch for a Vegetable Garden from JoeGardener (3 minutes).
        - Ask: Why are straw or dried leaves good mulch for a vegetable garden? (Answer: because they will break down and add nutrients to the soil.)

Hands-On Activity: Weeding and Mulching (20 minutes)

- Pass out garden tools (gloves, shovels, trowels).
- Show students which areas in the garden need mulch. Demonstrate how to apply the mulch materials.
- Demonstrate how to remove weeds, making sure to pull up the whole root so that the weed doesn't grow back later. Show students what to do with the weeds they pull up.
- Send students out to the garden to identify and remove weeds or apply mulch to designated areas.

Reflection and Closing (10 minutes)

- Bring students back together for discussion and recap key points covered in the lesson.
    - Why do you think it's important to remove weeds from the garden?
    - How does mulching help plants grow?
    - What are some different types of mulch?
- Ask students to share their thoughts and experiences from the hands-on activity.
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Resources

42 Common Weeds in Lawns and Gardens: Identification & Control (web article from The Spruce)

6 Best Mulch Options for Your Vegetable Garden (web article from The Spruce)

Best Mulch for a Vegetable Garden (3-minute video from JoeGardener, available on YouTube)

How to Amend Raised Bed Garden Soil for Continued Health (4-minute video from JoeGardener, available on YouTube)

MODULE: MAINTAINING A HEALTHY GARDEN

Soil Types

75 minutes

This lesson provides high school students with a basic understanding of soil composition. By engaging in a hands-on experiment, students actively explore the properties of 3 soil types, fostering a deeper appreciation for the vital role of soil in ecosystems and gardening.

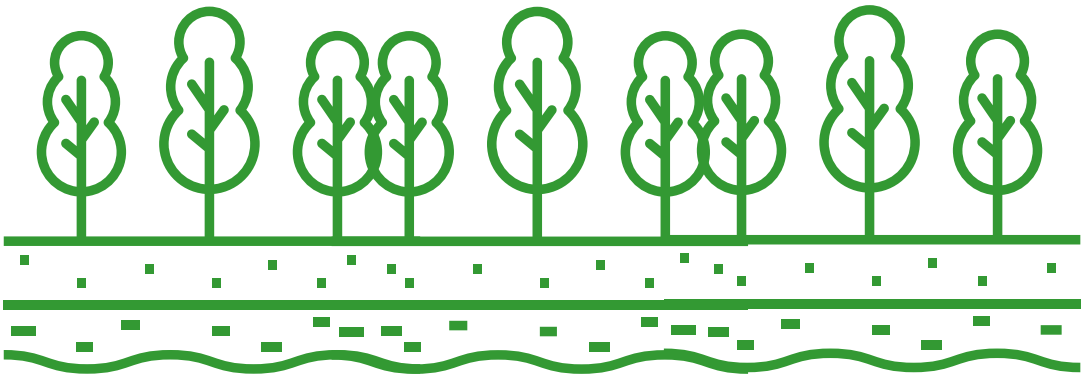
Learning Objectives

Learners will be able to…

- Understand the concept of soil composition and the significance of soil in the environment
- Identify 3 distinct soil types based on their physical properties (sand, silt, clay)

MATERIALS

- ☐ Whiteboard
- ☐ Projector
- ☐ Buckets of soil from several different locations
- ☐ Water
- ☐ Clear glass jars with lids
- ☐ Trowels
- ☐ Spoons
- ☐ Magnifying glasses (optional)



Word Bank

Soil: the top layer of the Earth's surface where plants grow.

Compost: a mix of rotten food scraps, plant waste, and leaves that helps plants grow

Fertility: how well soil supports healthy plant growth

Organic: made up of dead plants, animal waste, or animals that were once alive

Silt: a type of soil with pieces that are smaller than sand but larger than clay

Loam: a type of soil that is a mix of sand, silt, and clay

Clay: a type of soil that is made up of little pieces of rock

Sand: A type of soil that is made up of small, loose pieces of rock that larger than clay

Topsoil: the upper layer of soil where plants grow their roots

Subsoil: the layer of soil under the topsoil

Bedrock: the bottom layer of rock under the topsoil and subsoil

Preparation

- ✓ Find enough clear glass jars for each student in the class to have one.
- ✓ Gather buckets of soil from several different locations. Make sure that one sample has good garden soil with plenty of organic material in it. Another sample should be made up of heavier materials, like sand.

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and find a spot in nature to sit and observe their surroundings. Have the students describe their sit spot and write down what they see, hear, and smell around them. Students can form small groups of 3-4 to share their observations with one another.

Vocabulary (10 minutes)

Introduce vocabulary with students. Add new words to the class word bank where everyone can see them. Ask which words students already know. If they don't know the word, can anyone guess what it might mean?

- Soil: The top layer of the Earth's surface where plants grow.
- Compost: A mix of rotten food scraps, plant waste, and leaves. It is used to help plants grow to be healthy.
- Fertility: How well soil supports healthy plant growth.
- Organic: Made up of dead plants, animal waste, or animals that were once alive.
- Silt: Pieces of soil smaller than sand but larger than clay. It feels smooth and can hold water well.
- Loam: A soil type that's a mix of sand, silt, and clay. It's great for plants because it drains water well, holds water, and has a balanced mix of vitamins that plants need to grow healthy.
- Clay: Made up of little pieces of rock. Feels soft like mud but can hold its shape.
- Sand: Made up of small, loose pieces of rock. Larger than pieces of mud or clay.
- Topsoil: The upper layer of soil you find on the ground. Topsoil is where plants grow their roots. Topsoil is the healthiest soil that plants need to grow.
- Subsoil: The layer of soil under the topsoil. Think of it as the helper soil that helps water drain away from the topsoil.
- Bedrock: Bottom layer of rock found under the topsoil and subsoil. Think of it as the strong rock that holds everything up.

What is Soil? (10 minutes)

- Ask students: What is soil? What do you think is in soil? Is all soil the same?
- Connect the lesson with students' prior knowledge. Ask students about their previous experiences with soil and gardening. Encourage them to share what they know about how plants grow and the role of soil in supporting plant life.
- Show students the video "Soil Profile of Earth" (2 minutes, by MocomiKids).
- Remind students that the Earth's soil has different layers. Guide students to explore the significance of the soil layers discussed in the video.
    - What is bedrock? Do you think plants can grow in it? Why or why not?

- How is topsoil different from subsoil?
- Why is topsoil important for plants?

- Explain the concept of soil composition and its importance in plant growth and ecosystem health.
  - Plants cannot grow without soil.
  - Soil holds the nutrients, water, and microorganisms that plants depend on.
  - Healthy soil keeps temperature and moisture more constant, so that plants can thrive in all seasons and weather. It is like the insulation on a house. It holds water in.
  - But not all soil is equally healthy for plants! Plants need a lot of organic matter in order to grow.

Soil Jar Experiment (30 minutes)

- Pass out materials: clear glass jars, soil samples from different locations, water, and magnifying glasses (optional).
- Demonstrate how to set up soil jars. Each student should fill a jar about halfway with a soil sample from one location. Label the jar with the location where the sample was taken.
- Encourage students to observe the soil samples closely, noting differences in color, texture, and particle sizes. If magnifying glasses are available, they can use them to examine the soil more closely.
- Instruct students to add water to each jar, leaving a few inches of space at the top. Then, guide them to shake the jar gently to mix the soil and water. Observe how the different soil layers settle over time.
- After the soil has settled, ask students to carefully observe the distinct layers that have formed in the soil jar. Encourage them to describe what they see.
  - The bottom layer is made up of sand, because it is the heaviest.
  - Silt will be on top of the sand because silt weighs less than sand.
  - Clay will be on top of the silt.
  - Water is on top of the clay. It looks brown because it has rotten organic material in it.
  - Floating on the top, there might be some organic material that hasn't fully rotted yet.
- Students can divide into groups of 3-4 to share their observations and compare samples from different locations. Does the soil gathered from different locations look similar or different? Are there any visible organisms, like worms? Based on what students have observed, which soil do they think is the healthiest for plants?

Class Discussion (10 minutes)

- Bring students back to the big group. Engage the class in a discussion about the significance of each soil component, their roles in soil fertility, and how soil composition affects plant growth and ecosystem health.
    - What do you notice about the different layers of soil?
    - Why do you think the layers formed like this?
    - Do you see any patterns or differences between the different soil samples?

Closing (5 minutes)

- Prompt students to reflect on what they have learned from the experiment.
    - What surprised you the most?
    - Based on what you learned today, what do you think we can do to make the soil in our garden healthier for plants?
        - Answer: We could add more organic matter (compost).

Photo: Jar with soil separated into visible layers

Resources

Soil 101 (2 ½-minute video by the Food and Agriculture Organization of the United Nations, available on YouTube)

Soil Profile of Earth (2-minute video by MocomiKids, available on YouTube)

Is Soil Alive? (11-minute video by One Cool Earth, available on YouTube)

The Jam-Jar Experiment (Website by the National Soil Resources Institute at Cranfield University)

Soil-net.com (Website with a variety of educational resources about soil, created by the National Soil Resources Institute at Cranfield University)

MODULE: MAINTAINING A HEALTHY GARDEN

Soil Nutrients

1 hour and 20 minutes

This lesson plan introduces students to the basics of maintaining healthy soil in the garden so that plants get the nutrients they need. Hands-on activities empower students to actively engage in gardening while emphasizing the importance of maintaining a thriving garden ecosystem.

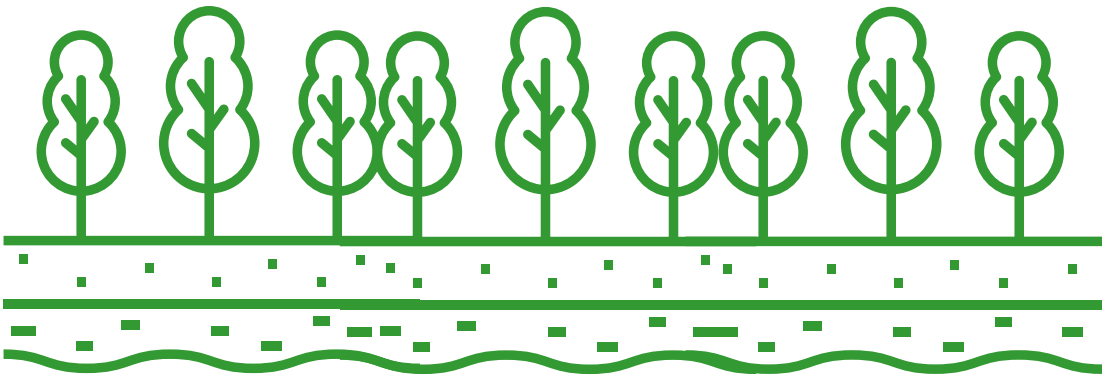
Learning Objectives

Learners will be able to…

- Explain the role of essential soil nutrients (nitrogen, phosphorus, potassium) and their impact on plant growth
- Recognize visual signs of nutrient problems in the garden
- Use soil testing kits to identify nutrient problems
- Add nutrients to the soil

MATERIALS

- ☐ Soil testing kits
- ☐ Compost, chemical fertilizer, or other soil amendments needed in the garden
- ☐ Garden tools (shovels, trowels)
- ☐ Buckets
- ☐ Garden gloves
- ☐ Wheelbarrow



Word Bank

Nutrients: things in the soil that help plants grow (plant food)

NPK: letters that represent the nutrients that help plants grow

Nitrogen (N): a nutrient that helps plants grow big and green

Phosphorus (P): a nutrient that helps plants make strong roots and flowers

Potassium (K): a nutrient that helps plants fight off sickness and grow fruit

Organic: without harmful chemicals; made up of dead plants or animals that were once alive

Preparation

- ✓ Purchase soil testing kits from a garden center or home improvement store. Be sure to purchase a type that gives instant results (some types must be sent away to a lab).
- ✓ Gather soil samples from the garden for testing.
- ✓ Read the instructions for your soil testing kit to make sure you have everything needed and can allow enough class time for students to see the results.
- ✓ Test the soil by yourself ahead of time so that you know what kind of soil amendments are needed.
- ✓ Purchase the necessary soil amendments at your local garden center so that students can add soil amendments in class.

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask them to pay special attention to the soil and the leaves on the plants. Have students write down what they see, hear, smell, and feel.

Soil Nutrients (15 minutes)

- Bring students back together. Ask what they observed in the garden today.
    - What did they notice about the plants?
    - What did they notice about the soil?
- Give a simple explanation of soil nutrients (NPK).
    - Nutrients: Nutrients are special things in the soil that help plants grow. They are like plant food.
    - NPK: NPK are letters representing the important nutrients that help plants grow.
        - N stands for nitrogen, which helps plants grow big and green.
        - P stands for phosphorus, which helps with making strong roots and flowers.
        - K stands for potassium, which helps plants fight off sickness and grow tasty fruits.
    - Plants also need other nutrients like calcium and magnesium. Not all plants need the same nutrients in the same amounts. Different plants have different needs depending on their species, growth stage, and environmental conditions. It is important to understand each plant's specific needs.
- How can we tell whether our plants are getting the right nutrients? We can recognize nutrient problems through observations. It's a good idea to look at the garden every day so that we can notice these problems early. Watch for:
    - Yellow leaves: If older leaves turn yellow, it might mean there is not enough nitrogen. If younger leaves turn yellow, that might mean there is not enough iron.
    - Slow growth: If the plant grows too slowly, it might mean there is not enough phosphorus or potassium.
    - Weird leaf colors: Unusual leaf colors like purple or red might mean there is a nutrient problem.
    - Leaf curling: If leaves curl up, it might mean there is not enough of another nutrient like zinc or manganese.
    - Few flowers or fruits: If the plant doesn't grow many flowers or fruits, it might mean there is not enough phosphorus or potassium.
- Images can be found on this website by West Virginia University, or show this 2-minute video from NParksSG.

Soil Testing (30 minutes)

Tell students that another way to tell whether plants are getting the right nutrients is to test the soil. We can use soil testing kits to find out.

- Explain the instructions on the soil testing kit.
- Take students outside to gather soil samples from different parts of the garden (or, you can save time by taking soil samples before class).
- Perform soil testing according to the instructions in the kit.
- Wait for results (about 10 minutes).
- Discuss the results with the class.
    - How much NPK is in our garden soil?
    - Did we get the same results from different parts of the garden?
    - Based on the results of the soil test, what nutrients need to be added to the soil to grow healthier plants?

Add Nutrients to the Soil (20 minutes)

- Tell students: Now that we know what our plants need, we can add nutrients to the soil.
- Work with students to add the appropriate amount of compost, fertilizer, or other soil amendments into the soil, according to the instructions on the package.

Reflection and Closing (5 minutes)

- Recap the key points covered in the lesson.
    - Why is it important for plants to have the right nutrients in the soil?
    - How might the plants in our garden look or grow differently if they don't have enough nutrients?
- Ask students to share their thoughts and experiences from the hands-on activity.
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Resources

How to Identify Plant Nutrient Deficiency (2-minute video by NParksSG, available on YouTube)

- This video shows signs of nutrient deficiencies to look for on plant leaves.

Nutrient Deficiencies in Plants (website by West Virginia University)

- See this website for descriptions and pictures of plants affected by nutrient deficiencies.

Soil Amendments (7-minute video by Better Homes and Gardens, available on YouTube)

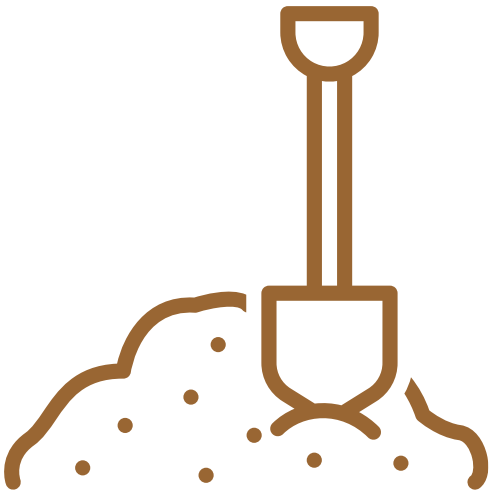
- Watch this video for an overview of different types of soil amendments for the garden.

How to Amend Raised Bed Garden Soil for Continued Health (4-minute video by JoeGardener, available on YouTube)

- This video discusses how and when to add compost and mulch to a vegetable garden.

Using Fertilizer in the Vegetable Garden (23-minute video by Growfully with Jenna, available on YouTube)

- This video is a good backgrounder for facilitators who want to improve their own basic knowledge.



MODULE: MAINTAINING A HEALTHY GARDEN

Insects and Pest Control

1 hour

This lesson plan introduces students to the basics of maintaining a healthy garden, focusing on environmentally-friendly pest control methods. Hands-on activities empower students to actively engage in gardening while emphasizing the importance of maintaining a thriving garden ecosystem.

Learning Objectives

Learners will be able to…

- Identify common garden pests
- Describe the impact of garden pests on plants
- Propose environmentally-friendly pest control methods

MATERIALS

- ☐ Gardening gloves
- ☐ Images or preserved specimens of common garden pests
- ☐ Environmentally friendly pest control options (neem oil, Captain Jack's Insecticidal Super Soap, or Garden Safe Insecticidal Soap)
- ☐ Ingredients to make organic insect repellent spray (chili peppers or cayenne, garlic, olive oil, spray bottles, empty milk jug)

Word Bank

Garden pests: bugs that eat garden plants

Beneficial insects: bugs that can help plants by protecting plants from pests or helping with pollination

Pest control: things that people do to stop bugs from eating plants

Natural predator: an animal that eats other animals

Aphids: tiny insects that like to eat the plants in our gardens

Ladybugs: red and black insects that eat aphids

Praying mantis: a type of insect that looks like a leaf. It eats aphids and other garden pests.

Organic: without harmful chemicals; made up of dead plants or animals that were once alive

Preparation

- ✓ Look up images of common garden pests in your region (available on the Fine Gardening website). Print images or prepare slides for students to look at in class.
- ✓ Purchase garlic and chili peppers to make organic pest repellent.

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask students to notice any insects or bugs that they see in the garden. Have students write down what they see, hear, smell, and feel.

Identifying Garden Pests (10 minutes)

- Ask students: Did you notice any insects or bugs in the garden? What kind? What were they doing?
- Explain the concept of garden pests in simple terms.
    - Garden pests are bugs that eat garden plants.
    - Aphids are a kind of garden pest. They are very tiny insects that like to eat the plants in our gardens. They can come in different colors like green or brown and they suck the juice from the plants, which can make the plants sick. Sometimes you might see them in big groups on the stems or leaves of plants.
- Show pictures of aphids and other common garden pests found in your local area so that students can learn to identify them.
    - Pictures of garden pests found in different regions of the United States are available in this web resource from Fine Gardening.

Pest Control Methods (15 minutes)

- Ask students: What do you think we should do if we don't want garden pests to eat our plants?
- Explain the concept of pest control in simple terms.
    - Pest control means finding ways to keep bugs and other critters from eating our plants. We want to protect our plants from these hungry visitors.
- Discuss environmentally-friendly pest control methods such as using natural predators or organic sprays.
    - Natural Predators
        - Ladybugs: These helpful insects eat aphids.
            - Find more information and pictures at National Geographic Kids.
        - Praying mantis: These insects eat many garden pests including caterpillars, aphids, and other insects that can harm plants.
            - Find more information and pictures at National Geographic Kids.
        - Birds: Many birds eat insects and can help control pests.

- Organic Sprays
    - Neem oil: Oil from the neem tree. It acts as a natural insect repellent and can disrupt the life cycle of pests.
    - Insecticidal soap: Made from natural fatty acids, it can be effective against soft-bodied pests like aphids, spider mites, and whiteflies.
    - Garlic and chili pepper spray: Mixing garlic and chili pepper with water can create a spray that keeps many pests away from plants.

- Pesticides are like medicines for plants. They help protect them from bugs and diseases. But just like we choose safe medicines for ourselves, it's important to pick pesticides that are safe for our food plants. This way, we can make sure our plants grow healthy and the food we eat is safe for us too. Remember, safety first, for both our plants and ourselves!
- Ask critical thinking questions.
    - What could happen if we didn't control pests in the garden?
    - How might pest control methods affect other living things in the garden?
    - Would we use different pest control methods in a garden that grows food for eating? Why?

Hands-on Activity: Protect the Garden (20 minutes)

- Explain that one easy, safe way to protect the garden from pests is to make pest spray out of garlic and chili peppers. Many garden pests think garlic and pepper taste bad. If we spray it on plants, insects, rabbits, and squirrels will stay away.
- Demonstrate how to mix up a batch of organic chili garlic spray. (Students can mix it themselves, or the facilitator can make a batch ahead of time.)
- Mix together:
    - 1 gallon of water
    - 5 teaspoons of garlic powder
    - 5 tablespoons of cayenne powder
    - 1 teaspoon of olive oil (can also use vegetable oil or mild dish soap)
- Students can then go outside to spray the plants in the garden. Students should wear gloves and wash their hands afterward, since skin can be sensitive to the hot pepper in the spray.

Note: This version of the recipe is quick and simple to mix up in class. For a more potent version, boil fresh ingredients in a pot of water and let them steep overnight (see recipe at the end of the lesson plan).

Reflection and Closing (5 minutes)

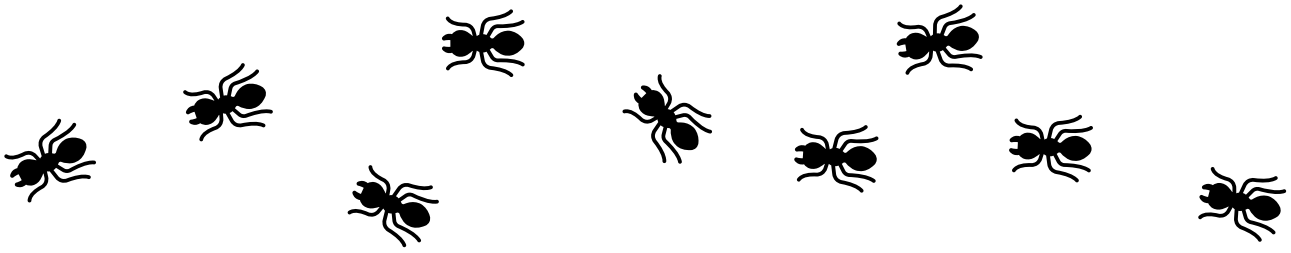
- Recap the key points covered in the lesson.
- Ask students to share their thoughts and experiences from the hands-on activity.
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Organic Pest Control

It's easy to make a simple organic spray that repels bugs and other garden pests. You can store the mix in a gallon milk jug.

- ✓ Crush 10 cloves of garlic.
- ✓ Finely chop 10 hot chili peppers (any kind).
- ✓ Boil the garlic and chilis in water for 15 minutes.
- ✓ Let the mixture cool. Leave it to soak at room temperature for 24 hours.
- ✓ Strain out any pieces that are big enough to clog a spray bottle.
- ✓ Add a teaspoon of olive oil, vegetable oil, or dish soap to help the mixture stick to plants.
- ✓ Pour the mixture into plastic spray bottles.
- ✓ Spray on plants.

Caution: This spray may irritate skin or eyes. Wear gloves and wash hands after spraying.



Resources

12 Common Garden Pests in the United States and How to Control Them (web article from Fine Gardening)

National Geographic Kids: Ladybugs (web article from National Geographic Kids)

National Geographic Kids: Praying Mantis (web article from National Geographic Kids)

MODULE: BIODIVERSITY IN THE GARDEN

Garden Pollinators

1 hour

In this lesson, students will consider the role of bees and other helpful insects as pollinators in the garden. They will select and plant native wildflowers that can attract wild species of bees to the garden. They will begin to see how biodiversity in their garden can contribute to a healthier local ecosystem where different kinds of plants and insects can thrive.

Learning Objectives

Learners will be able to…

- Discuss the benefits of biodiversity in the garden
- Explain the role of beneficial insects like bees and butterflies in pollinating garden plants
- Plant native wildflowers to attract wild bees and other pollinators to the garden

MATERIALS

- ☐ Seeds to grow native species of wildflowers (or live plants)
- ☐ Garden bed or containers
- ☐ Soil and compost
- ☐ Watering cans or spray bottles
- ☐ Trowels or small shovels
- ☐ Gardening gloves
- ☐ Projector (to show a video)

Word Bank

Biodiversity: having many different types of plants and living things in one area, such as different plants, insects, and animals

Beneficial insects: bugs that can help plants by protecting plants from pests or helping with pollination

Pollination: when insects or other animals move pollen from one flower to another. Plants need pollination to make seeds and fruit.

Ecosystem: a community of living things, such as plants and animals, and the environment they live in

Habitat: a place where a plant or animal naturally lives

Bee: a type of insect that helps pollinate plants. Some types of bees make honey.

Wildflowers: flowers that grow naturally in a local area. They can attract wild bees to help pollinate the garden.

Native plants: plants that grow naturally in a local area and are adapted to local weather

Photo Credit: Kristin Slaby

Preparation

- ✓ Get garden beds (or pots) ready for students to plant.
- ✓ Research local species of wildflowers and prepare some images to share in class. This website from the World Wildlife Federation is a good source.
- ✓ Obtain seeds to grow wildflowers that are native to your local area (or purchase live plants at your local garden store).

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask students to pay attention to what kinds of insects they see in their part of the garden. Have students write down what they see, hear, smell, and feel.

Introduction (10 minutes)

- Ask students what insects they noticed in the garden.
    - Did you see any bees? Butterflies?
    - What were the insects doing?
    - Do you think the insects are helping or hurting the garden?
- Explain in simple terms how beneficial insects help with pollination.
    - Beneficial insects are insects that help the garden by protecting plants from pests, or by helping with pollination.
    - Pollination happens when birds, bees, butterflies, or other animals carry pollen from one flower to another. Plants need pollination to grow seeds and fruit. Many kinds of insects and birds help with pollination. But the best pollinators are bees.
    - Beneficial insects are an important part of the garden ecosystem. Insects and plants need each other to live.

Classroom Learning: Pollinators (20 minutes)

- Show students the PBS video The Power of Pollinators (6 minutes).
- Ask follow-up questions.
    - How many species (kinds) of wild bees are there in North America? (Answer: 4,000+)
    - Is the number of bees in North America growing or shrinking? Why?
    - What do you think would happen if there were no bees in the world?
    - What are some things we can do in our garden to make a better habitat for bees and other pollinators? (use fewer chemicals, plant native species of flowers)

- What is a native plant? Why is it important to grow native plants in the garden?
    - Wild bees use native plants for food. When wild bees have food to eat, they can help pollinate the garden.
- Introduce some examples of wildflowers that are native to your local area, with pictures.
    - Black-eyed Susans, Brown-eyed Susans, Prairie Asters, Coneflowers, White Evening Primrose, and Butterfly Weed are good examples of native wildflowers that grow in many parts of the United States. See this resource from the World Wildlife Federation for pictures of wildflowers that are native to your area.
- Remind students that growing native plants and wildflowers helps with biodiversity by attracting wild bees and other pollinators.
    - Biodiversity means having many kinds of plants and living things in one area. When we have biodiversity in a garden, it helps create a balanced and healthy environment for plants and animals.

Hands-on Activity: Native Plants and Wildflowers (15 minutes)

- Divide students into small groups of 4-5. Provide each group with a small garden bed or container and gardening tools.
- Have each group select seeds or live plants to add to the garden.
- Have each group plant their chosen plants in the garden, paying attention to appropriate depth and spacing. Remind them to give the new plants plenty of water.

Reflection and Closing (5 minutes)

- Ask students to share their thoughts and experiences from the hands-on activity.
- Recap the key points covered in the lesson. Encourage students to share their observations and thoughts.
- Suggested critical thinking questions include:
    - Why is it important to grow native plants and wildflowers in the garden?
    - What else can we do in our garden to help make a healthy ecosystem for different kinds of plants and insects?
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Resources

What Should I Plant? Native Wildflowers by Region (web article by the World Wildlife Federation)

- See this website to look up wildflowers that are native to your region.

The Power of Pollinators (6-minute video by PBS, available from YouTube)

- This short video gives an introduction to biodiversity among North American wild bees, and what people can do to create healthier habitats for them.

Pollination (web article by the Pollinator Partnership)

- This short article gives some basic information on pollination (no pictures).

My Garden of a Thousand Bees (website by PBS and other partners, with videos and other educational resources about bees

- See this website for several short educational videos (between 7 and 20 minutes) about bees, pollination, and biodiversity, suitable for showing in the classroom.

Photo Credit: Kristin Slaby

MODULE: BIODIVERSITY IN THE GARDEN

Healthy Garden Ecosystems

1 hour

In this lesson, students will explore the concepts of biodiversity and healthy ecosystems. Learners will build self-sustaining miniature ecosystems using native mosses and weeds found outside. This activity will help them think about the different components of a healthy ecosystem.

Learning Objectives

Learners will be able to…

- Explain the concept of biodiversity
- Describe how different components of a garden ecosystem (water, soil, plants, insects, etc.) work together to create environmental balance
- Discuss what might happen in the garden if some part of the ecosystem is missing or out of balance

MATERIALS

- ☐ Tall glass jars with lids
- ☐ Spray bottles
- ☐ Gravel
- ☐ Pieces of window screen mesh cut to fit inside the jars
- ☐ Scissors
- ☐ Garden soil
- ☐ Trowels
- ☐ Small plants, with roots attached
- ☐ Living moss
- ☐ Small rocks (for decoration)
- ☐ Springtail culture
- ☐ Long tweezers, chopsticks, pencils, or other tools for arranging things inside the jars
- ☐ A spoon (for transferring springtails)
- ☐ Paper towels (for drying up moisture on the inside of the jars)
- ☐ Magnifying glasses (optional)

Word Bank

Biodiversity: having many different types of plants and living things in one area, such as different plants, insects, and animals

Ecosystem: a community of living things, such as plants and animals, and the environment they live in

Beneficial insect: bugs that can help plants by protecting plants from pests or helping with pollination

Nutrients: things in the soil that help plants grow (plant food)

Mold: a type of fungus that lives in wet places and helps break down dead plants or animals

Habitat: a place where a plant or animal naturally lives

Preparation

- ✓ Purchase a live springtail culture from the reptile section at your local pet store (or order from online).
- ✓ Find or purchase tall glass jars with airtight lids. Any tall glass jar (such as a spaghetti sauce jar) will work. Wash the jars well and remove any labels.
- ✓ Go outside and gather some moss, rocks, and small plants with roots attached. Depending on how much time is available in class, students can gather their own or the facilitator can do it ahead of time. If students will be gathering these items themselves, scout the area ahead of time to locate some living moss.
- ✓ Use scissors to cut a circle of window screen mesh sized to fit each jar (or do this with students in class).

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask students to pay attention to all the kinds of living things in the garden. Have students write down what they see, hear, smell, and feel.

Introduction (10 minutes)

- Ask students to make a list of all the living things they noticed in the garden (plants, insects, birds, worms, etc.) Remind students that each living thing does something important in the garden. None of them can live without the others.
- Introduce the concept of an ecosystem in simple terms. An ecosystem is a community of living things, such as plants and animals, and the environment they live in.
    - Ask students: What are all the parts of a healthy garden ecosystem? (Make sure to mention plants and insects as well as soil, water, and light.)
    - Remind students that a healthy garden ecosystem needs balance between all of these things (not too much, not too little). Ask students: What do you think would happen to the garden if one of these things was missing?

Activity: Building a Mini Ecosystem (1 hour)

- Tell students that today we are going to build our own mini ecosystems.
    - Hold up a glass jar. Ask students: What do you think we need to make a tiny garden ecosystem inside this jar? (Water, soil, plants, insects, air)
- Take students outside. Give them trowels. Ask them to find moss, small plants, and small rocks that they would like to use in their tiny ecosystem. Remind them to choose very small things that can fit inside a jar. They will only be able to fit about 1-2 very small plants. Tell them to dig up tiny plants very carefully so that the roots stay attached. (15 minutes)

  Note: It may be helpful to scout the area ahead of time and locate some living moss that students can gather.
- Bring students back together. Make sure each student has a glass jar, chopsticks or tweezers, and a small piece of window screen.
- Build the mini ecosystem. At each step in the process, discuss the role of each component in keeping the mini ecosystem healthy and balanced.

- Put about 1 inch of gravel in the bottom of the jar. This makes a place for extra water to drain.
- Put the window screen circle on top of the gravel. This stops the soil from going to the bottom of the jar.
- Add a layer of garden soil, leaving several inches for plants to grow.
- Add springtails. Springtails might come packed in moist soil or charcoal. Simply use a spoon to put a little of that soil or charcoal in each jar. If there is water in the culture, you can also put that in the jar.
    - Tell students to notice what the springtails look like. These tiny insects need water to live. They eat dead plants and insects. They also eat mold and fungus. They will help keep things clean. When they die, their bodies will add nutrients to the soil.

  Note: Springtails can jump, but they do not bite. They die quickly in dry environments, so they will not spread outside the jar.
- Add moss on top of the soil. Use tweezers and chopsticks to gently arrange the small plants, making sure the roots are covered by soil.
- Add small rocks to decorate.
- Use a spray bottle to add enough to get everything inside the jar wet, as though it is raining.
- Screw the lid onto the jar. The mini ecosystem is complete!

- Ask students: If we leave the jar closed, what do you think will happen? Does the ecosystem have everything it needs to stay healthy?
    - The mini ecosystems should be self-sustaining. Everything they need is already inside, so it is not necessary to do anything else to keep them alive. Over time, the plants should take root and the springtail population should be able to reproduce itself without any additional food.
    - A note about air and water: The springtails and decaying plant matter produce carbon dioxide, which the plants use for photosynthesis. And the plants create the oxygen that keeps the springtails alive. If they are in perfect balance, they can sustain one another. But if they are not in perfect balance, it may be necessary to open the jar for a few minutes every week or two to let in some fresh air. If there is too much water, you can leave the jar open for a while to let some evaporate.
- Students can take their mini ecosystems home and set them in a sunny window. Or, you can keep them in the classroom and observe changes over time.

Reflection and Closing (5 minutes)

- Encourage students to share their observations and thoughts about the hands-on activity.
- Suggested critical thinking questions include:
    - What do you think will happen inside the jars a week from now? A year from now? Do you think they will still be alive?
    - Different students chose different plants. Do you think all the plants have the same needs? Will they all be able to survive in this closed ecosystem?
    - What can we do in our garden outside to make sure our plants are living in a healthy ecosystem?
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Optional Extension

Some types of plants are better suited to life in a closed terrarium than others. For this project, we have left it up to students to pick from what is naturally available outside. This means there is some uncertainty about how well the plants will grow. If different students choose different plants, this lesson can be extended by observing and comparing results over time.

Resources

How to Make a Terrarium with Our Easy Step-by-Step Guide online article from The Spruce)

- This website gives instructions for how to make a basic terrarium, including suggestions for plant species.

DIY Jar Terrarium: A Beginners' Guide (4-minute video from Terrarium Designs, available on YouTube)

Forest in a Glass Jar (4-minute video from the Urban Nemophilist, available on YouTube)

- This short video shows how to make a closed terrarium in a glass jar using moss, small plants, and springtails.

One Year Update – Forest in a Glass Jar (4-minute video from the Urban Nemophilist, available on YouTube)

- This short video shows the same terrarium, still thriving 1 year later.

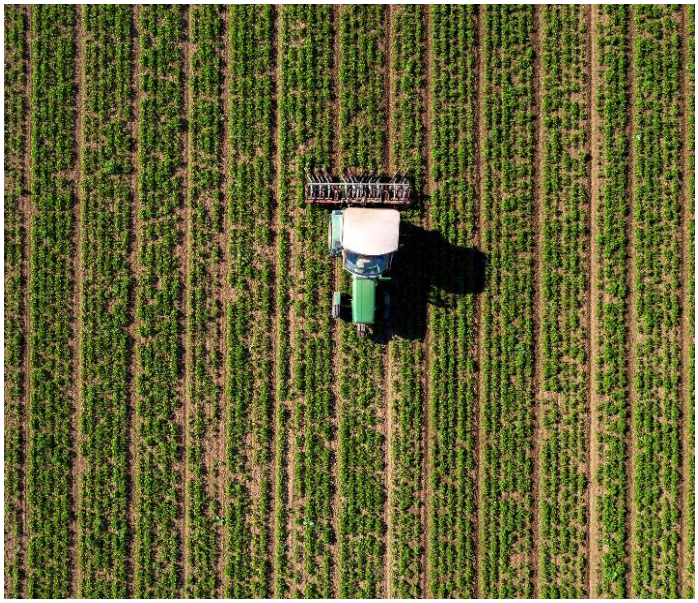
Native Terrarium Built with Garden Weed and Wild Plants (11-minute video from the Urban Nemophilist, available on YouTube)

- This video shows the steps to make a closed terrarium using native plants gathered from outside.

MODULE: BIODIVERSITY IN THE GARDEN

Biodiversity and Monocropping

1 hour



In this lesson, students will explore the concept of biodiversity. They will learn about some of the problems that can happen as a result of monocropping, when farmers grow a lot of the same plant in one field. Through activities and discussions, students will think about why it is important to grow many different kinds of plants together in the garden. This lesson is a good choice for a day the weather is not suitable for outdoor gardening activities.

Learning Objectives

Learners will be able to…

- Describe the benefits of biodiversity in the garden
- Recognize the difference between monocropping and polycropping
- Explain the potential drawbacks of monocropping, including reduced soil health, increased vulnerability to pests and diseases, and negative impacts on food production
- Generate concrete ideas about ways to promote biodiversity in the garden

MATERIALS

- ☐ Sticky notes in several different colors
- ☐ A bowl, hat, or other container
- ☐ Images of monocropping (such as a cornfield) and polycropping
- ☐ Projector (to show a video)

Lesson Planning

This lesson can be used alone or in combination with others in the Biodiversity in the Garden series. It can serve as a lead-in to the Exploring Companion Planting lesson. It can be combined with the Garden Pollinators lesson. Or it can be a stand-alone lesson on a rainy day when students can't work outside.

Word Bank

Biodiversity: having many different types of plants and living things in one area, such as different plants, insects, and animals

Ecosystem: a community of living things, such as plants and animals, and the environment they live in

Monocropping: when farmers grow a lot of the same kind of plant in one field. Monocropping is also called monoculture.

Polycropping: when farmers grow different kinds of plants together in the same field to help each other grow better. Polycropping is also called polyculture.

Habitat: a place where a plant or animal naturally lives

Vulnerable: easily harmed or damaged

Preparation

- ✓ Prepare some images of monocropping to share with students. This article from Greentumble is a good source.

Activity Breakdown

Introduction (20 minutes)

- Introduce the concept of biodiversity in simple terms. Biodiversity is when there are many different kinds of plants, insects, and animals living in the same place.
    - Ask students: What are some reasons why biodiversity is important for a healthy garden?
- Tell students: When we plant a garden, we can choose to plant the whole garden with one kind of plant (monocropping / monoculture), or we can have many different kinds of plants together (polycropping / polyculture). Which do you think is smarter? Why?
    - Monocropping, also called monoculture (growing one kind of plant):
        - Monocropping is popular because it's efficient to take care of one big field full of the same kind of plant. It's easy to harvest and sell the crops because everything is ripe at the same time. But there are many problems with pests and diseases.
    - Polycropping, also called polyculture (growing many kinds of plants):
        - Polycropping is better for feeding a family because there are many different things to eat. There are usually fewer problems with pests and diseases.

    Note: For background information (including images of monoculture farming), see the Greentumble article Advantages and Disadvantages of Monoculture Farming.
- Give each student one colored sticky note. Make sure to give out a mix of several different colors. Ask students to put the sticky notes on their shirts where others can see them.
- Tell all the students to stand up. Tell them to imagine that each student is a plant. In this garden, there are many different kinds of plants. Each color of sticky note is a different kind of plant growing a different kind of food (potatoes, apples, carrots, corn, etc).
    - Choose one student to act the part of a disease. That student will close their eyes and choose a colored sticky note out of a hat without looking. Students with the same color sticky note on their shirts must sit down. Their plant is dead!
    - Ask students: How many of the plants in the garden died? How many lived? What would happen if you were trying to feed your family from this garden? Would you still have enough to eat?
    - Ask students: What could happen if all the plants were the same color? (Answer: All the plants would die at the same time, and we would have no food.)
- Ask the students if they have ever heard of this happening in real life.

- Tell students: In Ireland in 1845, most of the farmers were monocropping. People in Ireland were only planting potatoes, and everybody was growing the same kind of potato. Can you guess what happened?
- In about 1845, a disease attacked the potato plants. All the farms were growing the same kind of potato, so the disease spread easily. The potato plants all died at the same time, and there was no food. At least a million people died from hunger.
- Ask students: So, was it a good idea for everyone to depend on the same kind of plant? (No!)
- Do you think this could ever happen again? What could farmers do to stop this from happening?

  Note: See this short History.com article for basic information about the Irish Potato Famine. (No photos of the Irish Potato Famine exist.)

Classroom Learning: Monocropping vs. Polycropping Today (30 minutes)

- Show students VICE News video Bananapocalypse: Why Bananas May Go Extinct (6 minutes).
- Ask follow-up questions.
  - Did anything about this video surprise you?
  - What is happening to the world's bananas?
  - Why do you think this is such a big problem?
  - What could farmers do about it?
  - Is this an example of monocropping or polycropping?
- Polycropping is another way to grow food that doesn't depend on just one kind of plant. Show students the GRIN-U video Three Sisters: Companion Planting of the North American Indigenous Peoples (11 minutes).
- Ask follow-up questions.
  - How is this kind of planting different from monocropping?
  - What are the 3 Sisters?
  - What does each of the 3 plants do to help the others grow?
  - Who invented the 3 Sisters method of planting? Why do you think they did it this way?

Reflection and Closing (10 minutes)

- Encourage students to share their observations and thoughts about the lesson.
- Suggested critical thinking questions include:
    - What kinds of plants are growing in our garden? Is our garden an example of monoculture or polyculture?
    - What can we do in our garden to promote biodiversity?
- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Resources

Irish Potato Famine (short article from History.com)

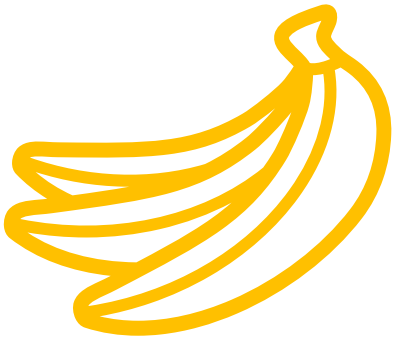
Bananapocalypse: Why Bananas May Go Extinct (6-minute video from VICE News, available on YouTube)

Three Sisters: Companion Planting of the North American Indigenous Peoples (11-minute video by GRIN-U, available on YouTube)

Monoculture vs. Polyculture (4-minute video from FoodUnfolded, available on YouTube)

Biodiversity (explanatory article with graphics and videos, from BiologyOnline)

Advantages and Disadvantages of Monoculture Farming (web article from Greentumble.com)



MODULE: BIODIVERSITY IN THE GARDEN

Exploring Companion Planting

1 hour and 40 minutes

In this lesson, students will learn about how certain plants can help each other grow better when they are planted together. Students will plant some of these helpful pairs themselves. By the end of the lesson, students will have a better understanding of how plants can work together in a garden. They will begin to see how biodiversity contributes to a healthier and more balanced garden ecosystem.

Learning Objectives

Learners will be able to…

- Discuss the benefits of biodiversity in the garden
- Explain the advantages of companion planting (enhancing soil fertility, repelling harmful pests, reducing weeds, etc.)
- Apply critical thinking skills to evaluate and select plant combinations for companion planting based on their mutual benefits

MATERIALS

- ☐ Small potted plants or seedlings from species suitable for companion planting
- ☐ Garden bed or containers
- ☐ Soil and compost
- ☐ Watering cans or spray bottles
- ☐ Printed cards for the Plant Pals Card Game
- ☐ Trowels or small shovels for planting
- ☐ Gardening gloves

Word Bank

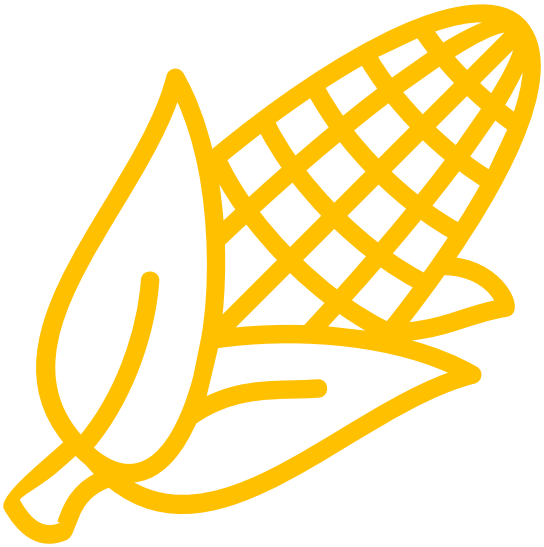
Companion planting: planting different types of plants near each other to help them grow better.

Biodiversity: having many different types of plants and living things in one area

Pest: an insect or animal that can harm plants by eating the leaves, stems, or fruit

Beneficial insects: bugs that can help plants by protecting plants from pests or helping with pollination

Soil fertility: how healthy the soil is for growing plants. Fertile soil has the right nutrients that plants need to grow.



Preparation

- ✓ Get garden beds (or pots) ready for students to plant.
- ✓ Decide on some suggested plant pairings that will work well in the garden.
- ✓ Purchase small plants or seedlings that are appropriate for companion planting.
- ✓ Prepare some images of companion plants to share in class. This article from the Farmers' Almanac is a good source.
- ✓ Print cards for the Plant Pals matching game (created by Salt Tree Art).

Activity Breakdown

Warm Up (10 minutes)

Have students go outside and pick a spot to sit and observe. Ask students to pay attention to what kinds of plants are already growing in their part of the garden. Have students write down what they see, hear, smell, and feel.

Introduction (15 minutes)

- Ask students what plants they noticed growing in the garden.
    - Which plants are next to each other?
    - Can you think of any reasons why it might be good to plant certain types of plants next to each other?
- Pass out printed cards for the Plant Pals matching game (one card for each student).
    - Ask students to read their cards.
    - Discuss: What plant is on your card? What benefit can this plant provide for other plants?
    - Tell students to look at the label in the upper left-hand corner of their card ("Food Forest", "Three Sisters", or "Pizza Garden". Students should stand up and find the other students with the same label, eventually forming 3 groups.
    - Discuss: What plants are in your group? Why is it a good idea to put these plants together?

Classroom Learning: Companion Planting (30 minutes)

- Explain that today we are going to talk about biodiversity. Ask: who can explain what biodiversity means?
    - Biodiversity means having many kinds of plants and living things in one area. When we have biodiversity in a garden, it helps create a balanced and healthy environment for plants and animals.
- Show pictures of gardens with companion plants. Ask students what they notice in the pictures.
    - Ask: What plants do you see growing next to each other? Why do you think the gardens are planted in this way?
- Introduce the idea of companion planting.
    - Companion planting means planting different types of plants near each other to help them grow better.
        - Some plants can keep bugs away from others.
        - Some plants (like beans) can help each other get important nutrients from the soil.
        - Tall plants can provide a structure for vines to climb, or they can provide shade for shorter plants that need a cooler place to grow.

        - Some plants attract beneficial insects. For example, flowers attract bees. Bees help to pollinate other garden plants.

- Share some examples of common combinations of companion plants.
    - Three Sisters: Planting corn, beans, and squash together. Corn provides a structure for beans to climb. Beans add nitrogen to the soil. Squash covers the ground, reducing weeds.
    - Marigolds with vegetables: Many garden pests don't like the smell of marigolds. Planting marigolds alongside vegetables like tomatoes or cucumbers can help keep pests away.
    - Carrots and peas: Planting carrots with peas can benefit both plants. Peas add nitrogen to the soil, which helps the carrots grow. Carrots can help support the pea plants as they grow.
    - Basil and tomatoes: Planting basil near tomatoes can improve the flavor of tomatoes. Basil has a strong smell that helps keep pests away.
- Ask students: Which combination of plants would you choose? Why?

Suggested variation: If there is time, or if students will be planting corn + beans + squash, consider showing the video Three Sisters: Companion Planting of North American Indigenous Peoples (11-minutes).

Hands-on Activity: Planting Pairs (30 minutes)

- Divide students into small groups of 4-5. Provide each group with a small garden bed or container and gardening tools.
- Have each group select a compatible pair of plants based on what they have learned about companion planting.
    - Ask: Why do you think these two plants would grow well together?
- Have each group plant their chosen plants in the garden, paying attention to appropriate depth and spacing. Remind them to give the new plants plenty of water.

Reflection and Closing (15 minutes)

- Ask students to share their thoughts and experiences from the hands-on activity.
- Recap the key points covered in the lesson. Encourage students to share their observations and thoughts about companion planting.
- Suggested critical thinking questions include:

- Why is it important to have different types of plants growing together in a garden? What benefits might this bring?
- Why do you think some plants are good at keeping pests away from others?
- How might planting tall plants next to short plants help them both grow better?
- Can you think of reasons why some plants might share important nutrients with each other through their roots?
- What might happen if a garden only had one type of plant and no other kinds of plants growing nearby?

- Encourage students to continue exploring gardening as a hobby and to apply their knowledge in their own gardens or community projects.

Resources

Companion Planting (web article by Kids Gardening)

- This short article gives some basic information on companion planting (no pictures).

Gardening Guides: Companion Planting (web article from the BBC)

- This short article suggests several beneficial plant combinations (no pictures).

Companion Planting Chart and Guide for Vegetable Gardens (web article from the Farmers' Almanac)

- See this online resource for an overview of companion planting, including a chart of suggested plant combinations with images.

Three Sisters: Companion Planting of North American Indigenous Peoples (11-minute video by GRIN-U, available on YouTube)

- This educational video is suitable to show in class if there is time, or if students will be planting corn + beans + squash in the garden.

Plant Pals Card Game (printable PDF resource from Salt Tree Art)

- This simple card-matching game introduces students to three different sets of compatible companion plants.

MODULE: HEALTHY FOODS

Post-Harvest Handling

1 hour and 5 minutes

This lesson plan on food safety aims to educate students about bacteria, cross-contamination, and basic food safety, including: handwashing, proper techniques for washing produce, and safe packaging of freshly-harvested vegetables.

Learning Objectives

Learners will be able to…

- Explain the concept of bacteria and its role in foodborne illness
- Demonstrate proper handwashing
- Identify and explain the risks of cross-contamination in food preparation
- Demonstrate proper washing techniques for harvest bins
- Pack freshly harvested vegetables to maintain their quality and minimize contamination

MATERIALS

- ☐ Sinks
- ☐ Tables
- ☐ Natural antibacterial hand soap
- ☐ Natural antibacterial dish soap
- ☐ Harvest bins
- ☐ Food-grade plastic bags or containers
- ☐ Fresh fruits or vegetables
- ☐ Disposable plastic gloves (optional)

Word Bank

Bacteria and fungi: tiny living things. Some types can make us sick.

Cross-contamination: when germs from one thing spread to another thing

Toxin: a poisonous substance that is harmful to people

Food-borne illness: a sickness caused when germs contaminate food

Preparation

- ✓ Print CDC handwashing and food safety posters and post them in the classroom.
- ✓ Harvest produce from the garden before class starts.
- ✓ Print copies of the Food Safety Post-Test.

Activity Breakdown

Introduce Vocabulary (10 minutes)

Write these vocabulary words on the whiteboard. For each word, ask students who can explain what it means. Review meanings with students.

- Bacteria and fungi are tiny living things. Some are good for us and some are bad. They can grow quickly in certain conditions. Bad bacteria in our food can make us sick.
- Toxins are poisonous substances that can be harmful to people. Toxins can be made by certain types of bacteria and fungi.
- Cross-contamination is when germs from one thing spread to another thing, like when bad bacteria or dirt on hands gets on food.
- Food-borne illness is a sickness caused when germs (such as bacteria and their toxins) contaminate foods.

Discussion: Understanding Bacteria & Fungi (15 minutes)

- Introduce key concepts:
    - Conditions for bacterial and fungal growth: Bacteria and fungi need specific things to grow, like temperature, food, level of acidity, and moisture.
    - How to control bacteria: To stop bacteria from spreading, we can keep food cold, cook food properly, use soap that kills bacteria, and prevent mixing different foods together.
- Show students the "For a Safe Plate, Don't Cross Contaminate" poster available at CDC Infographics and ask them questions about what they see.
    - Which of these food safety techniques do you use at home?
    - Can you think of any additional food safety practices that could be added to the poster?
    - Why does the poster tell us to separate raw meats and vegetables?
    - Why is food safety important?

Post-Harvest Food Safety Activity (15 minutes)

In this demonstration, the facilitator actively guides the students through the proper procedures and techniques for maintaining food safety. Explain the importance of each action, reminding students of the need to eliminate bacteria and prevent cross-contamination.

- Demonstrate proper hand-washing techniques with the class. Have all the students wash their hands. Remind students to clean the backs of their hands, between their fingers, and under their nails. Scrub with antibacterial soap for 20 seconds before rinsing.
    - See handwashing posters available from the CDC.
    - Younger students may sing along with this handwashing song set to the tune of "Frere Jacques".
- Together with students, wash and clean harvest bins. Remove all visible dirt on the surface of the container. Clean the harvest bin, sink, and table with natural anti-bacterial soap.
- Thoroughly wash vegetables with water. No soap is needed in this step. Check the produce for insects and rotting spots. Discard any food that has significant damage from bugs or that looks rotten.
- Lay produce out to dry.
- Pack vegetables in fresh food grade bags or containers to prevent the food from spoiling. Store vegetables in a cool place, preferably between 37°F (3°C) and 50°F (10°C).

Harvesting tip: Harvesting vegetables in early morning or in cooler temperatures aids in food preservation.

Optional: Wear clean gloves for added safety. To prevent cross-contamination, do not touch other items or touch your face while handling food with gloves on.

Cooking Food Safety (10 minutes)

- Highlight the importance of washing hands, surfaces, and utensils before cooking.
- Talk to students about why it is important to avoid using spoiled or rotting vegetables.
    - Spoiled or rotten vegetables can harbor bad bacteria, molds, or toxins that can cause food-borne illness.
- Highlight the importance of using separate cutting boards for meat and vegetables to prevent cross-contamination.
- Explain the "4-Hour Rule". The 4-Hour Rule is a guideline that helps prevent the growth of bacteria on food. Foods should not be kept at room temperature (outside of the refrigerator) for more than 4 hours. After this time, the risk of food-borne illness increases significantly.
- Tell students that cooked food should be refrigerated within an hour of cooking.

Food Safety Certification Post-Test (5 minutes)

All students must pass the Food Safety Post-Test to participate in cooking activities.

Closing (5 minutes)

- Discuss the answers to the Food Safety Post-Test.
- If there is extra time, you can conclude this lesson with a role-playing activity where one student acts as a restaurant cook and another as the customer. The cook should intentionally demonstrate improper food handling practices. This exercise will allow students to point out the actions that should be avoided to ensure food safety.

Resources

Food safety posters from the Center for Disease Control at CDC Infographics

Handwashing posters from the Centers for Disease Control

Sing Along to Top and Bottom Handwashing Song (C&K Childcare)

Name: _____ Date: _____

Food Safety Post-Test

1. Which of these things do you NEED to do to make sure garden vegetables are safe to eat? (Circle all that apply.)

a. Wash your hands with soap and water before washing or packing vegetables.
b. Pack vegetables in clean bags or containers.
c. Wear gloves.
d. Wash surfaces with antibacterial cleaner or soap.
e. Compost vegetables if they have bugs on them.
f. Compost vegetables if they are rotting or spoiled.

2. Write down 2 things you need to do to prevent bacteria and fungi from growing on your food.

_____
_____

3. When you are cooking food, which of these things do you NEED to do to make sure your food is safe to eat?

a. Do not cut different kinds of vegetables on the same cutting board.
b. Wash your hands with soap and warm water before preparing food.
c. Put prepared food in a cooler or fridge.
d. Wash your hands with soap and warm water after touching raw meat.
e. Wash all surfaces with antibacterial cleaner or soap.
f. Do not cut meat and vegetables on the same cutting board.

MODULE: HEALTHY FOODS

What's in a Nutrition Facts Label?

95 minutes

In this lesson, students learn how to read and understand nutrition facts labels on packaged food items, gaining the skills to healthier and more informed food choices.

Learning Objectives

Learners will be able to…

- Identify the components of a nutrition facts label (serving size, calories, etc.)
- Discuss the importance of reading and understanding nutrition facts labels for making informed and healthy food choices
- Evaluate the information on a nutrition facts label to assess the nutritional value of foods
- Compare and contrast nutrition facts labels on different food products to make healthier choices

MATERIALS

- ☐ Whiteboard
- ☐ Projector
- ☐ Various packaged food/drink items
- ☐ Nutrition label worksheets
- ☐ Pictures of nutrition facts labels
- ☐ Printed food pictures (see What Food Am I? game)

Word Bank

Calories: units of energy that our bodies get from the food we eat

Serving size: the amount of food a person should eat at one time

Carbohydrates: fuel for our bodies

Proteins: building blocks that help our bodies grow taller and stronger

Fats: a special kind of energy that our bodies store for later

Sodium: salt

Vitamins and minerals: nutrients that our bodies need in small amounts to stay healthy

Preparation

- ✓ Gather a selection of packaged food and drink items. Try to select culturally relevant food items commonly found in the learners' local grocery store.
- ✓ Take pictures of the nutrition facts labels on packaged foods to display in class.
- ✓ Print copies of the Nutrition Facts Label Worksheet.
- ✓ Print food pictures for the What Food Am I? game.

Activity Breakdown

Warm Up (10 minutes)

Play the What Food Am I? game (developed by FoodCorps).

- Have students gather in a circle. Explain: "I'm going to tape a picture of a food onto each of your backs. Then we're going to play a game called 'What Food Am I?'. We have to ask each other yes/no questions to figure out what we have on our backs."
    - Before starting, model the game with another adult. The guesser must ask yes/no questions only.

        - "Am I a fruit?" "Do I come in a box?" "Am I spicy?" (These are yes/no questions.)
        - "What color am I?" is not allowed because it is not a yes/no question.
    - Tape a food image to each student's back, making sure their match is in the mix.
    - Remind students to keep the foods they see on their classmates' backs secret. The game isn't fun if we tell the secret without the person guessing.
    - Start the game. Have students walk around the room, asking each other yes/no questions.
    - If a student guesses their food, the student can move the picture onto their front and continue answering questions for other players.
    - Give students about five minutes to play and then call them back into a circle.

Vocabulary (10 minutes)

Write vocabulary words on the whiteboard. For each word, ask students who can explain what it means. Review meanings with students.

- Calories: Calories are little units of energy that our bodies get from the food we eat. They help us grow, play, and do all the things we love!
- Serving size: Serving size means the amount of food we should have in one go. This tells us how much we should eat to stay healthy.
- Carbohydrates: Carbohydrates are like fuel for our bodies. They give us energy to run, jump, and play. Foods like bread, pasta, and rice have carbohydrates.
- Proteins: Proteins are like the building blocks for our bodies. They help us grow taller and stronger. Foods like meat, fish, eggs, and beans have proteins.
- Fats: Fats are like a special kind of energy that our bodies store for later. We need some fats, but we should choose healthy fats from foods like avocados, nuts, and seeds.
- Vitamins: Vitamins are like tiny superheroes that help our bodies stay healthy. They are found in fruits, vegetables, and other foods. Each vitamin has a special job to do!
- Sodium: Salt. Our bodies need a little salt, but too much salt is bad for us. We should try not to eat very much sodium.
- Minerals: Minerals are like little helpers that keep our bodies working properly. They help our bones grow strong and our bodies stay healthy. Foods like milk, cheese, and leafy greens have minerals.

Understanding Nutrition Facts Labels (50 minutes)

Introduction (10 minutes)

- Show students the Elsevier video "How to Read a Nutrition Facts Label" (3 ½ minutes).
- On the screen, show a picture of a nutrition facts label and ask the students if they know what information is on this kind of label.
    - Explain that nutrition facts labels give important details about what is in the food we eat.

Label Analysis (15 minutes)

- Show students how to find important information on the nutrition facts label, like serving size, calories, and ingredients.
- Explain the meaning of percentages and daily values.
- Explain that ingredients like salt (sodium) and sugar contribute to health issues including heart disease, high blood pressure, and diabetes.
    - It's best to eat very little salt (sodium) and sugar. Try to eat 15% daily value.
- Explain that nutrients like fiber and vitamins are very good for us. These nutrients help with digestion, lower high blood pressure, prevent sickness, keep our bones and teeth strong, and give us energy.
    - Try to choose foods with high amounts of fiber and vitamins. Try to eat 30% daily value or more in every meal.

  Note: Try to select food items that represent the foods commonly found in the learners' community grocery store. Ideally, the foods chosen should be culturally relevant to learners.

Group Activity (15 minutes)

- Divide students into small groups of 4-5.
- Give each group different food items and ask them to work together to identify key information and discuss the nutritional value of the products.
    - Encourage students to ask questions and help each other.
    - This activity promotes collaboration, critical thinking, and application of learned concepts.

Guessing Game with Real-Life Examples (10 minutes)

- Show pictures of common food items, such as snacks or drinks, and discuss what students think the nutrition facts labels might say. Follow up by showing the actual nutrition facts label for these items so students can check their guesses.

- Suggested items: bottle of soda, bag of chips, chocolate bar, bottle of juice, package of cookies, carton of milk, container of yogurt

- Ask students which choices they think might be healthier based on the information they found on the labels.

Individual Practice (15 minutes)

- Pass out a Nutrition Facts Label Worksheet and a real-life food item to each student.
- Ask students to complete the exercises on the worksheet.
- Walk around the class to offer assistance or answer questions.

Closing (10 minutes)

- Play a quick game to review key points with students. Show students the FDA video Are you Smarter Than a Food Label? (5 minutes). Pause the video after each question and ask students to give the answer if they know it before resuming the video to reveal the correct answer.
- Ask students to share one thing they learned about reading nutrition labels.
  - Encourage them to continue practicing their skills.

Homework (Optional)

Assign students to find a nutrition label at home or online and write a short paragraph about what they learned from it. Were they surprised by anything they learned?

Resources

Get to the Source: What Food Am I? (Game developed by FoodCorps)

How to Read a Nutrition Label (3-minute video by GoodLife Fitness, available on YouTube)

How to Read a Nutrition Facts Label (3 ½-minute video by Osmosis from Elsevier, available on YouTube)

Are You Smarter Than a Food Label? (5-minute video by the US Food and Drug Administration, available on YouTube)

Nutrition Facts Label Worksheet

1. Name of item:

2. How many servings are in the container?

3. What is the serving size?

4. If you want to feed this to 20 people (20 servings), how many containers do you need?

5. How much sugar is in 1 serving? (If there is no sugar, look at the salt/sodium instead.)

6. How much sugar is in the entire container? (If there is no sugar in this, look at the salt/sodium instead.)

7. 4 grams (4g) of sugar = 1 spoon of sugar. How many spoons of sugar are in the entire container? (If there is no sugar in this, look at the salt/sodium instead.)

8. Do you think this item is healthy? Why or why not?

Garden (Re)Design

OAKLAND, CALIFORNIA

The lessons in this module are designed to provide hands-on experiential learning to help high school students develop practical skills that are transferable to occupational fields such as design, landscaping, construction, or agroecology. Learners will be empowered to take control of their own learning and believe in their ability to affect change. The module includes seven lessons:

Garden (Re)Design

- Field Annotations & Observations
- Turning Ideas Into Reality
- Tool Demonstration & Practice
- Action
- Community Celebration

Cooking from the Garden

- Writing Recipes
- Cooking Together

The Garden (Re)Design module was designed by Anna Hickman. The Cooking from the Garden module was designed by Olive Bartholomew. Both modules were tested by Anna Hickman, Olive Bartholomew, and Zach Reidman at the International Rescue Committee office in Oakland, California.

New Roots in Oakland, California

Situated in the Bay Area of northern California, the Oakland New Roots team maintains close partnerships with the Alameda County Community Food Bank (ACCFB) and the Oakland Unified School District (OUSD). Programming is focused at two newcomer high schools, Oakland International and Rudsdale Continuation Newcomer, which serve approximately 450 newcomer students and their families. Programming includes weekly food distribution, youth-led internships, community events, and push-in garden education with teachers.

How to use this curriculum

This series has been implemented with high school age youth in partnership with teachers and school staff. This curriculum has been adapted as a 1.5-hour weekly project as part of our after-school internship, as well as longer form collaboration in 45-minute increments with teachers' ecology units, and alongside students' classwork with literature such as Paul Fleischman's *Seedfolks.* This curriculum is meant to be adaptable to fit a variety of different timelines, whether it is a week-long intensive program or a project that students return to every few weeks. Possible adaptations and extensions of this lesson series include field trips, partnering with relevant community leaders to increase exposure to career paths (carpenters, landscapers, etc.), extended duration for larger or more complex projects, or scaling the project to a YPAR (Youth Participatory Action Research) model.

Transferable skills

The emphasis on hands-on experiential learning in this curriculum facilitates a space for students to cultivate and practice skills such as teamwork, project management, and problem-solving, as well as hard skills transferable to occupational fields such as design,

landscaping, construction, and agroecology. One additional extension to consider at the end of the lesson series would be to have students work together to create or update their resumes with their new skills and description of completed projects.

A Note on Popular Education

The model of learning exhibited in this series is inspired by Paulo Freire's philosophy of popular education—a pedagogy of education that makes little distinction between teacher and learner but rather draws on collective participation wherein everyone is empowered to take control of their own learning and believe in their ability to affect change. For more information, The Highland Center on Research and Education offers a beautifully-illustrated guide on related education tools in both English and Spanish.

MODULE: GARDEN (RE-)DESIGN

Field Annotations & Observations

45 minutes

Students will observe various garden spaces to identify and annotate various components of garden design. They will then walk through their own garden space to reflect and begin dreaming without constraints about how they want to design or re-design the space.

Learning Objectives

Learners will be able to…

- Express observations through annotations
- Identify current garden conditions and describe the feelings the space evokes
- Envision new ideas for the garden

MATERIALS

- ☐ Poster paper
- ☐ Pictures of different garden spaces to use as examples
- ☐ Writing utensils
- ☐ Pictures of the proposed garden space, printed on translucent paper
- ☐ Laptops (optional)
- ☐ Sketchbooks (optional)
- ☐ Cameras (optional)

Word Bank

Garden bed: a structure used to hold soil to grow garden plants

Trellis: a vertical structure or system on which vining plants can climb upward

Soil: the top layer of the earth's surface where plants grow; made up of living and non-living organisms. Soil is an ecosystem!

Words that students will likely already know: shady, sunny, plants, flowers, weeds, calm, peaceful

Preparation

- ✓ Find and print pictures of different garden spaces, showing a variety of conditions and infrastructure. Glue onto poster paper.
- ✓ Print slightly transparent pictures of the existing garden space for students to draw on.

Activity Breakdown

Warm Up (10 minutes)

Ask students to think of a garden they have visited—or an outdoor place that they like—either here or in their home country. Prompt students to reflect on how they feel when they are in that space and what they like about it. Before students share, the facilitator can model their own reflection—including aspects of design, how it has been special in food memories, and how their body feels when they are in that space. Students can then form small groups of 3-4 to share with one another.

Following principles of popular education, the beginning of this series is a time to name learning expectations as well as the knowledge students already possess through their lived-experiences. In this exercise and throughout the lesson series, all students are treated as experts. We start this way to acknowledge that we are all teachers and learners—and that going forward, this will be a collaborative process that draws on our collective experiences.

Observations & Annotations (30 minutes)

- Using poster paper with pictures of different garden spaces, students can stay in their small groups to annotate and observe different garden conditions. Depending on students' needs, they can do this sitting, or the posters can be hung in various parts of the room to give students a movement break. The facilitator can model these observations, encouraging students to be liberal with notes. Ask guiding questions like: "What do you notice in the picture?" or "What do you think it would feel like if you stood here?"

  Tip: Encourage students to write in their own language if they don't know the English words. Different students may make the same observation in multiple languages. This will create an opportunity to review the posters together to create a shared vocabulary.

- Give students a few minutes with each poster before they switch. Once students have had an opportunity to visit each poster, the whole group can re-gather and students can share their observations. Referencing students' annotations, this is a great place to start compiling a word bank.

- Students will then walk through the existing / proposed garden space, keeping the same guiding questions in mind. Students can flip over the same poster papers to write their observations, or use a separate paper. They can then answer the question "What would you like to feel?" or "What would you like to change?" Keep the posters with students' written observations handy in the classroom for students to refer to in future lessons.

  Optional: If computers are available, students can take a few minutes to do their own research on garden design ideas to gather inspiration.

- The remaining time will be spent with students sketching, drawing, taking pictures (their choice of expression). They can dream—without constraints—of what they want their garden space to look like.

  Note: Students will likely have different levels of comfort and confidence around sketching. A good tool for this is to print out slightly transparent pictures of the proposed garden space for students to draw their ideas onto.

Closing Reflection (5 minutes)

Have students lay out all of their sketches (finished or not) on a table or pin them up on a wall so everyone can see them all together. Take a few minutes for students to note the ideas they see and re-summarize the kind of environment and feelings they want to create in the garden.

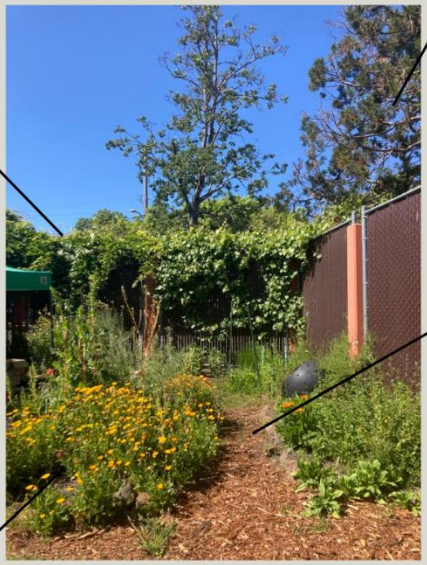
Adaptations

This lesson assumes existing school garden infrastructure, but it can also be adapted for schools with little to no existing infrastructure. If there is an existing garden, students can envision ways to expand or add to it (a new section, a greenhouse, an irrigation system, etc). If they are starting with an empty space, students can imagine what kind of garden they want to build.

As an optional extension, the class may go on a neighborhood walk and take pictures of gardens they see and later use these student-taken pictures for the activity.

poster paper

poster paper



Resources

The Highland Center on Research and Education offers a beautifully-illustrated guide to popular education tools in both English and Spanish.

MODULE: GARDEN (RE-)DESIGN

Turning Ideas Into Reality

45 minutes

This lesson will build on the observations that students made in the previous lesson to encourage students to choose two or three projects they would like to implement in the garden. Students will practice different methods of measuring and drawing to make a plan for their design.

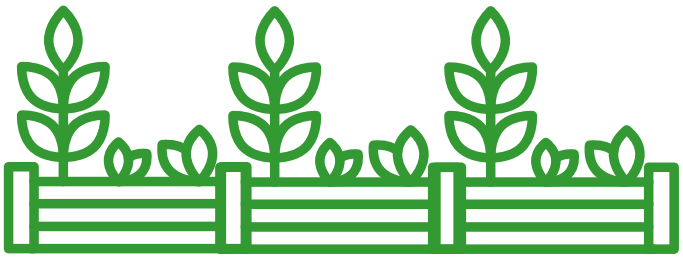
Learning Objectives

Learners will be able to…

- Believe that their ideas can become reality
- Make measurements of the garden space
- Turn garden design ideas into concrete action steps

MATERIALS

- ☐ Annotated posters and student sketches from the previous class
- ☐ Word bank from the previous class
- ☐ Pictures of the garden space printed on translucent paper
- ☐ Poster paper
- ☐ Paper
- ☐ Pencils
- ☐ Tape measures (optional)
- ☐ Laptops (optional)



Word Bank

Measure: to calculate dimensions

Ruler, tape measure: tools used to calculate dimensions using units of inches and feet (or centimeters)

Dimensions: Height, width, depth

Units: inch, foot, yard, centimeter, meter

Build on the word bank created by students during the previous class. Add words for other tools/materials relevant to students' ideas (hammer, nails, etc).

Preparation

- ✓ Print slightly transparent pictures of the existing garden space for students to draw on.

Activity Breakdown

Warm Up (5 minutes)

In the classroom or garden, have students brainstorm tools they know or have used for measuring (ruler, tape measure, etc) as well as units of measurement (inch, foot, yard, mile). Encourage students to think of what they might use to measure if they didn't have these tools (hands, feet, bricks, etc). Have students stretch out their arms and compare to find who has the longest or shortest wingspan. Measure how many wingspans long is the classroom, garden, table, etc.

Practice Garden Measurements (10 minutes)

Expanding upon the warm-up, students will visit the garden space or another space in the school to practice measuring objects and recording their dimensions. Have students choose one object to measure on their own or with a friend. Students should measure the object's height, width, and depth. If applicable, students can write a list of the materials needed to make the object. Facilitators can check in with students, helping with missing measurements / drawings as needed. As students finish, each group will share out their object's measurements and materials.

Revisit Last Class (5 minutes)

- After students have shared about the objects they measured, take a few minutes to revisit the annotated posters from the previous class.
- Take a few minutes to have students reflect on what they want the purpose of the garden to be. What is a garden for? Do all gardens need to be the same? What is the purpose of our garden? (growing food, feeling peaceful, building community, etc.)
- Have students collectively summarize the design ideas they came up with. Ask them to identify two or three projects they want to undertake (for example, designing and building a trellis, creating an art mural, incorporating more seating, etc).

Garden Walk & Measuring (15 minutes)

- Students will revisit the garden space to envision project ideas. They will draw their own project designs—including measurements as well as type and quantity of materials needed.

  Note: As in the last class, have pictures of the garden space printed out for students who prefer to annotate and write measurements on top of images.

- It may be helpful to have laptops available for students to conduct additional research about their design ideas (i.e., for a trellis, students might compare trellis designs and styles and research necessary materials).

Closing (10 minutes)

Have students collectively summarize their design ideas and vote on an achievable number of projects for the group to undertake (i.e., design and build a trellis, paint a mural, incorporate seating, etc.).

As students discuss their ideas, this is a place to name constraints. Before students vote on the projects, have them discuss how long they think each project would take, how that fits within the timeline of remaining class periods, and other relevant resource constraints.

After Class

The next lesson will focus on using found or already-existing inventory of tools and supplies to begin students' projects. Consider what tools and supplies you may already have available (scrap wood, paint, tools, etc.) If you do not have many materials on hand, it may be helpful to locate some basic tools and materials before the next class.

MODULE: GARDEN (RE-)DESIGN

Tool Demonstration & Practice

45 minutes

This lesson introduces students to tools and safety practices that are relevant to their projects, and empowers students of all skill levels to feel confident using new resources. Students will have time to practice with tools before gathering materials and getting the space ready to start their projects.

Learning Objectives

Learners will be able to…

- Use tools safely
- Properly store, clean, and care for tools
- Identify tools and materials that are needed for their projects
- Make a specific plan and budget for acquiring necessary tools and materials

MATERIALS

- ☐ Whiteboard
- ☐ Paper & pencils
- ☐ Tools and materials needed for students' chosen garden projects (power drill, screwdriver, saw, hammer, wheelbarrow, paint, tape measure, etc)
- ☐ Safety equipment (safety goggles, gloves, etc)
- ☐ Laptops

Word Bank

Students will create their own word bank by adding English words for tools and materials relevant to their projects (hammer, drill, screwdriver, paintbrush, etc).

Preparation

- ✓ Review the project ideas that students identified in the previous lesson.
- ✓ Make a list of tools and materials needed for students' projects.
- ✓ Gather tools and materials that are already available.
- ✓ Think through tool safety, cleaning, and storage guidelines to cover with students.
- ✓ Determine whether there is money available for the class to purchase additional materials.

Activity Breakdown

Warm Up (10 minutes)

With gathered tools and materials, have students try to name the items they know. Hold up each tool and ask the class to identify it in English. Write words on the whiteboard as students list them. Alternatively, the facilitator can have a vocabulary list already written so that students can try to guess which name belongs with which tool.

Tool Demonstration + Material Research (30 minutes)

Split the class in half, making sure that all the students who are working together on a project are together in the same group. One group will begin with tool demonstration while the other group works on researching and gathering needed materials. The groups will switch after 15 minutes.

Tool Demonstration

- Demonstrate proper use of tools, emphasizing appropriate tool safety, including:
  - Tool safety
  - Eye protection
  - Measuring and marking cut lines
  - Sketching out designs on walls (if students are making art murals)
  - How to cut materials safely, how to drill holes, etc.
  - How and where to store tools when they are not in use

Note: Encourage students with prior experience to co-lead tool demonstrations with supervision, when it is possible to do so safely. When using power tools, consider using the "I do / we do / you do" progression to let students gain confidence in a safe way. First, the facilitator can demonstrate. Next, the facilitator and student do it together. Last, the student does it alone.

- If there is time, students can practice cutting and drilling with scrap pieces of wood. This kind of practice is an opportunity to empower those who have less experience or may not be as confident.

Material Research

- Students will regroup with their project group, review their plan together, and identify what tools and materials they need to get started. Students should gather materials from what is already available.
- If materials are already gathered, encourage students to think about the following questions:
    - How can we get our space ready? Can we sketch on the wall? Can we mark out where our design will go or where we need to make cuts? Do we need to clear any weeds or move soil?
- If students do not have all the materials they need, they should use laptops to research what materials they need and where to get them. Have students create a *specific* list of materials and the amounts needed. Emphasize to students that they are making their ideas a reality. Ask students to consider the following questions:
    - Does our class have a budget to purchase additional materials? What materials can we find or reuse without buying anything? What websites or local stores can we use to purchase materials? How much do these items cost? How much do we need? Which items fit within our project budget?

    Note: The facilitator may want to suggest local stores or websites for those who are not sure where to start.

Closing (5 minutes)

Collective cleaning: Remind students that we are taking care of our garden space and the tools we use in it—therefore, we all work to clean as we go and take care of our community resources and tools.

Optional Extension: Field Trip

If time and resources permit, students may go on a field trip to a local hardware or lumber store to gather materials. The group can work together to navigate, utilize their budget, find necessary items, and explore a new space they may not be familiar with.

Optional Extension: Tool Workshop

Patriarchal beliefs around gender and skill-sets may come up during this lesson. Make sure that students who are more comfortable or experienced with tools are giving space to those who may not have as much experience. This may be a great opportunity to propose an additional tool workshop outside of class for those who may not be as confident, or to create a more intentionally safe space for practice (i.e. a femme tool workshop). This could be after school, during lunch, etc. Tool workshops should be student-led where possible. If no student feels confident to lead, this might mean a facilitator works with a student before the workshop to help them practice so that they can lead.

MODULE: GARDEN (RE-)DESIGN

Action

45 minutes

Stepping away from more structured lessons, this class is primarily a work day for students to actively construct their designs. This lesson is meant to be adapted and repeated as many times as needed, depending on the scale of projects and time needed to complete them.

Learning Objectives

Learners will be able to…

- Safely and confidently use basic construction tools
- Problem-solve and refer to one another when questions arise around tool-use or design
- Move ideas into action

MATERIALS

- ☐ Project plans from previous classes
- ☐ Word bank from previous classes
- ☐ Paper & pencils
- ☐ Tools and materials needed for students' chosen garden projects (power drill, screwdriver, saw, hammer, wheelbarrow, paint, tape measure, etc.)
- ☐ Safety equipment (safety goggles, gloves, etc.)

Word Bank

Encourage students to try using the vocabulary they have assembled in previous classes as they work together in the garden.

Students can build on their existing word bank by adding English words that are relevant to their projects (hammer, drill, screwdriver, paintbrush, etc.).

Preparation

- ✓ Before this class, review the list of necessary tools and materials that students identified in the previous lesson.
- ✓ Make a plan to acquire materials, taking into account the class budget.
- ✓ Collect and/or purchase needed tools and materials.

Activity Breakdown

Warm Up (5-10 minutes)

For this class, students will be working in groups. When possible, have students self-select and join the group of whichever project they are most passionate about. If groups are unbalanced, students are capable of deciding which projects need more effort and reorganizing their own groups.

Start class by asking each group to review where they are in the project plan, what got done last time, and what their next steps are for today.

Project Build (30-35 minutes)

Students will work in groups to construct and implement their projects. Encourage students to use the new vocabulary from the word lists they assembled in previous classes as they work together in the garden.

This lesson can be repeated as many times as needed for students to finish their projects.

Closing (5 minutes)

Students will help clean and put away the tools and materials they were using. Emphasize again collective care for the garden space and finding a safe place for any unfinished projects.

If needed, take a moment to discuss what needs to happen in the next class. Are there any questions to answer or problems that need to be solved before next time? Are students missing any materials that they need to finish their projects?

Optional Extension: Tool Lending Library

Many cities and communities have public tool-lending libraries where patrons can borrow tools for little to no cost. In Oakland, there is a Tool Lending Library connected to the public library close to school. As students continue working on their projects, this is an opportunity to introduce them to such spaces or help them sign up for lending libraries.

MODULE: GARDEN (RE-)DESIGN

Community Celebration

45 minutes

For the final class of the series, students will plan and prepare a community event to celebrate their work, share their knowledge, and invite other members of the school community into the new garden space. There are many ways to celebrate. Students can use the ideas in this lesson plan as inspiration as they plan their own celebration.

Learning Objectives

Learners will be able to…

- See themselves as teachers and skill-sharers in their garden spaces
- Invite community members into a participatory space
- Share knowledge with their community

MATERIALS

- ☐ Reflections about garden spaces that students shared in lesson 1
- ☐ Garden tools
- ☐ Paper & pencils
- ☐ Art/craft supplies
- ☐ Poster paper
- ☐ Basic cooking & serving materials

Word Bank

Students can continue adding to the word bank with any English words that are relevant to their community celebration plans.

Preparation

- ✓ Decide what day / time the celebration will take place.
- ✓ Determine whether the class has a budget available for food, decorations, or other materials.

Activity Breakdown

Warm Up: Reflection & Intentions (10 minutes)

Students will have space to invite others to share their garden knowledge and skills. With the whole class together, look again at the reflections that students shared in the first class about other garden spaces they have visited and how they felt. Spend a few minutes having students read these out loud. Then, ask students to reflect on how the new garden space makes them feel. Discuss in groups of 3-4.

Emphasize that all of the knowledge and experiences students have collected across different gardens over time (in their countries of origin and in this garden space at school). State for students that the goal for today is to think about how to invite the wider school community to feel welcome in the new garden space so that we can invite them to share our knowledge and experiences.

The facilitator can set parameters for the celebration, splitting students into groups according to tasks and activities. Students can decide what these groups will look like and what activities they want to include.

Party Preparation (30 minutes)

Party preparation should be largely student-led, but the facilitator might want to set any relevant expectations and let students know what resources will be available to them.

Food Group

If possible, students can utilize one or more ingredients from the garden to facilitate a garden taste-test at the celebration. Students will use class time to develop a recipe based on what's available in the garden, harvest ingredients, and write a shopping list for any additional ingredients needed for cooking. At the celebration, the community can be invited into the preparation/cooking process. Examples of recipes using garden produce include: salsa, herbal tea, sauteed vegetables, fresh juice, or other ideas that students might have.

Craft Group

This group will develop a plan and collect materials needed to set up a craft station for people to join at the party. Examples of possible craft activities include: painting garden beds; using natural objects found in the garden to create collages or temporary mandalas, writing garden haikus, etc.

Students can check in with art teachers or other staff to gather needed materials before preparing the station. Local paint stores often have returns or color samples that are offered at a discount or for free.

Gardening Group

This group will prepare a station where people can participate in any gardening needs. This might include weeding, harvesting, planting seeds, preparing seed trays, mixing compost, etc. Students will evaluate current garden needs to make a plan and collect needed materials.

Announcement / Invitation Group

This group will be in charge of inviting the school community to the celebration. This might involve creating and putting up posters around the school, distributing invitations or flyers, or practicing language skills by making in-person announcements to other classes (notify teachers in advance). If students make verbal announcements, work with them to develop and practice the sentence structure they will use.

Setup / Decoration Group

This group will be responsible for decorations, as well as identifying and gathering general materials needed for the celebration. Depending on the class budget, students can put up purchased decorations or use class time to make their own.

Closing (5 minutes)

Students will work to tidy the space and put things away. Take a moment to discuss how students plan to find or make any necessary items that are not already on hand.

Optional Extension

If the community celebration will involve food, see Cooking From the Garden Lessons 1 & 2 for ideas on how to incorporate student-led cooking activities.

MODULE: COOKING FROM THE GARDEN

Writing Recipes

90 minutes

This lesson uses the garden or farm as a resource to inspire newcomer high school students to write recipes using produce that is in season, which they will cook and eat in future sessions. This lesson can also be adapted for younger students.

Learning Objectives

Learners will be able to…

- Explore seasonality by investigating what produce is available in the garden
- Write out a recipe that uses seasonal produce from the garden and share with the class

MATERIALS

- ☐ Whiteboard
- ☐ Poster paper
- ☐ Cookbooks to use as examples
- ☐ Blank journals or notebooks to make into recipe books
- ☐ Printed recipe-writing templates
- ☐ Pens/pencils
- ☐ Art supplies for decorating students' recipe books
- ☐ Small prizes for the bingo game

Word Bank

Seasonal: depending on the seasons or the time of year

Recipe: a set of instructions for preparing a particular dish, including a list of ingredients

Ingredients: foods that are combined to make a particular dish

Serving: the amount of food needed for one person to eat

Preparation

- ✓ Gather published cookbooks for students to look at in class.
- ✓ Print enough icebreaker bingo cards for each student to have one.
- ✓ Print enough copies of the recipe-writing template for each student to have several.
- ✓ Write "Word Bank" at the top of a poster paper.

Activity Breakdown

Warm Up (15 minutes)

Introductions

- Have students introduce themselves, giving their name, pronouns, and a food that starts with the same first letter as their name. Have students repeat each other's names and foods.

Icebreaker Bingo

- If students don't know each other, break the ice by playing bingo. In this game, students walk around the room and find another person who matches the description in each box on the printed bingo card. That person writes their name in the box. The first student who gets 5 in a row (up and down, across, or diagonal) shouts BINGO and wins a prize.

Opening Discussion (10 minutes)

- Ask students for a show of hands: Who knows how to cook?
- Ask students what their favorite thing is to cook. How did they learn to make it (from a parent, from a class, from a book)? Do they write down their recipes, or do they just remember them?
- Tell students that in this class, we are going to write down recipes of interesting foods that we can make using plants that are growing right now in the garden.
- Write the word *seasonal* on the word bank sheet. Ask who knows what it means. What word does it come from?
    - Explain that the word *seasonal* comes from *season* (spring, summer, fall, winter). Different plants grow in different seasons. Some like hot weather and some need cool weather. We will plan our recipes based on what is available in the garden during this season. What kinds of fruits and vegetables do you think might be growing right now in our garden?
    - During the lesson, continue to add unfamiliar words to the word bank.

Garden Tour (25 minutes)

- Walk through the garden. Ask students if they recognize anything that is growing. Share the names of plants and their potential uses.
- Encourage students to write down (or take pictures of) 3 plants they could use in a recipe.
- Bring students back to the classroom. Ask them to share what foods they saw in the garden that they could use in a recipe.
- If these students will be working in the garden in future seasons, ask if there is anything else they would like to grow. Talk about which seasons are best for those plants.

Recipe Writing (35 minutes)

- Explain that we will be cooking various recipes in class, and we would love to share our cultures through food.
- Ask: What is a recipe? If you wanted to cook something you had never made before, what kind of instructions would you need? (ingredients, measurements, cooking time, etc.)
- Pass out cookbooks for students to look at. Ask students to look at how the recipes are written. Discuss the main information needed for a recipe (ingredient list, materials list, step-by-step instructions, number of portions, cooking time, photos of food, etc.).
- Give students time to write down a recipe that uses at least one ingredient growing in the garden. Encourage them to think of a favorite dish that they would like to share with others. If they don't know how to make it, they can check the cookbooks for ideas or look up recipes on the internet.
    - Students will use the printed worksheet to write down their chosen recipe, including: ingredients and materials (with quantities and measurements needed), number of servings, and step-by-step instructions. Students may also want to look online for pictures of the foods they want to make.
    - As they work, students can write down cooking-related words that are not familiar to them, and add them to the class word bank. This might include:
        - Ingredients (names of fruits and vegetables, noodles, spices, etc.)
        - Kitchen tools (cutting board, measuring cup, mixing bowl, vegetable peeler, etc.)
        - Cooking-related verbs (chop, peel, stir, boil, simmer, fry, roast, bake, etc.)
        - Measurements (teaspoon, tablespoon, cup, ounce, handful, bunch, dash, etc.)

- If some students finish early, they can decorate blank journals or notebooks and add their name on the cover. Explain that in future weeks, they will add recipes for the foods we cook in class. These will become recipe books that they can take home after the end of the course.
- When students are done writing, have them present their recipe ideas to the class. Ask students what recipe they would like to make next week, considering the time we have and what resources are available (i.e., is there an oven?). Decide as a class which student(s) will be responsible for leading the cooking along with the facilitator.

  Note: If students want to share a food that they know from home but aren't sure exactly how to make it, they can take home a printed recipe template and ask family members to show them what to do. They can bring the written recipe back to share it in the next class period.

Closing (5 minutes)

- Ask students if they found anything in the recipes that they have questions about. If they found unfamiliar words, discuss the meaning and add them to the word bank.
- Ask students to share one thing they are excited to learn or cook during the class.

Adaptation

This lesson is intended for newcomer high school students, but it can also be adapted for younger students. If you are working with younger students, ask them to take the recipe template home and work with their caretakers to write down a family recipe. They can write it in another language if they like, and students can use class time to investigate English words that they don't know.

Resources

Oxford Picture Dictionary (English). Sections on food and cooking have pictures to help students identify English words for fruits, vegetables, kitchen tools, and cooking-related verbs.

Seed catalogs with pictures are also useful for this purpose.

ICEBREAKER BINGO

Find someone who matches the description for each box. Have them sign their name. When you get a five across, up and down, or diagonal, you can call out BINGO for a prize.

Find someone who...

Has a birthday this month	Is the oldest child	Loves to cook	Plays soccer	Has a pet
Has a tattoo	Loves to read	Takes the bus to school	Is from a different country than you	Likes the same music as you
Doesn't drink coffee	Speaks two or more languages	**FREE SPACE** 	Can skateboard	Likes to dance
Likes to hike	Can play an instrument	Has an allergy	Loves to draw	Plays videogames
Is wearing contact lenses	Has the same favorite food as you	Knows how to swim	Can do a cartwheel	Has farmed or gardened before

Recipe / Receta: _____

By / Por: _____ Servings / Porciones:_____

Ingredients / Ingredientes:

Include quantities and measurements /
Incluir cantidades y medidas
etc.

Materials / Materiales:

For example: 2 pots, 1 pan, 3 stoves, gloves, etc. /
Por ejemplo: 2 ollas, 1 sartén, 3 estufas, guantes,

Directions / Instrucciones:

MODULE: COOKING FROM THE GARDEN

Cooking Together

2 hours

This lesson can be used in tandem with the recipe-writing lesson to create a sequence where students have several opportunities to cook together, with different student(s) leading their recipes each time. If you are cooking with students only once, this lesson can be used as a guide for general safety protocols and kitchen setup.

Ideally, it is best to have at least two hours with students. However, if time is limited, you can adjust by using quicker recipes, prepping some food in advance, or facilitators may elect to clean up after students have left.

Learning Objectives

Learners will be able to…

- Put into practice basic food safety skills, including handwashing, knife safety, proper handling of raw meat, and cleaning and sanitizing dishes
- Cook and eat a meal together with other students, using seasonal ingredients from the garden

Word Bank

Food safety: making sure that everything in the kitchen is clean and meat is fully cooked, in order to prevent food-borne illness

Food-borne illness: a sickness that comes from eating or drinking contaminated food

Post the list of cooking-related words that students compiled in the recipe-writing class. Encourage students to try out these words while cooking.

MATERIALS

- ☐ Pens/pencils
- ☐ Whiteboard
- ☐ Printed recipe-writing templates
- ☐ Notebooks or journals for recipe books
- ☐ Word bank from the recipe-writing class
- ☐ Photo of what the finished food will look like
- ☐ Food ingredients to make the chosen recipe(s)
- ☐ Stove (can be portable)
- ☐ Sink (or 3 bins for dishwashing)
- ☐ Tables
- ☐ Pots, pans, skillets
- ☐ Cooking utensils
- ☐ Mixing bowls
- ☐ Knives and cutting boards
- ☐ Dishes, forks, spoons for eating
- ☐ Containers for leftovers

Preparation

- ✓ Decide ahead of time what recipe(s) to make and which student(s) will lead. With larger groups, consider doing more than one recipe or adding beverages and side dishes so that everyone has something to contribute.
- ✓ Review the ingredient list with the student leaders ahead of time. Check the amounts and find out whether specific brands are needed. Double check to make sure they didn't forget anything—especially spices!
- ✓ Shop for all the ingredients listed in the student recipe.
- ✓ Print copies of the recipe-writing template.
- ✓ Find and print a picture of the recipe you will be making. (Student leaders may already have one.)
- ✓ Consider which items take the longest time to cook and whether any food prep work needs to be done ahead of time.
- ✓ Set up the kitchen space and wash system. (See examples of a mobile setup below.)

Photo: Example of mobile cooking setup

Mobile Kitchen Setup

Food Prep Setup

Kitchen setup can be flexible! You can still cook with students, even if your school doesn't have a kitchen. At our schools in Oakland, cooking with students is entirely mobile. We cook outdoors on propane camping stoves, and we use rolling carts to move all our supplies (oils, spices, pots and pans, kitchenware, bowls, strainers, etc.).

- Start your kitchen setup an hour before class starts. Set up several camping stoves. Organize pots, pans, oils, spices, bowls, cutting boards, knives, and utensils so that they will be readily available.

Wash System Setup

- Set up a three-bin wash system if you do not have a sink nearby. Fill each bin with an equal amount of water. The first two can have warm water if it is available.
    - Bin 1: Warm water mixed with soap. This is where the dishes will be scrubbed.
    - Bin 2: Warm water with nothing added. This will be the rinse station.
    - Bin 3: Cold water with a sanitizing tablet or a few drops of bleach. A recommended amount of bleach is ¼ cup to one gallon of water.
    - Make sure to have a space for drying dishes. You can use more bins, a clean table, or drying racks. Or you can have students use a drying rag to wipe them off before putting them away.

Photo: Example of mobile three-bin wash setup

Activity Breakdown

Warm Up (5 minutes)

Introductions

- Reintroduce names and pronouns
- Ask an icebreaker question. You can use one of the following:
    - What do you like to eat on a cold day?
    - Who is the best cook you know?
    - What was the best food you've ever had?
    - If you could only drink one beverage for the rest of your life, what would it be?

Kitchen Safety (15 minutes)

- Introduce the student leaders who will be leading today's cooking session. Write the name of the recipe on the whiteboard. Pass around a picture of what the end result may look like.
- Explain the concept of food safety. We need to follow some basic rules in order to prevent cuts and burns, and to prevent food-borne illnesses. Demonstrate or ask students to demonstrate some basic kitchen safety practices:
    - First, wash your hands with soap and water. Avoid touching cell phones, and rewash hands if you need to.
    - Wash ingredients as needed.
    - Cook meat to an appropriate temperature.
    - Use gloves when handling raw meat.
    - Never leave a stove unattended while it is turned on.
    - Be careful around hot oil—use tongs or other utensils as needed.
- Demonstrate basic knife safety rules:
    - When walking with a knife, keep it at your side and pointed down.
    - When cutting, use a cutting board.

- When possible, keep the flat side of the food face-down so that it doesn't move while you cut.
- Shape the hand that is not using the knife like the letter "c" to avoid cutting fingertips.
- Separate cutting boards and knives used for raw meat from those used for produce.
- Make sure knives are regularly sharpened.

- Explain the dish-washing system that you would like students to follow. If you are cooking outside or if no sink is available, explain the three-bin wash system.

Recipe Sharing (15 minutes)

- Give the student leader(s) time to share their recipe.
- Write step-by-step instructions on the whiteboard.
- Pass out recipe writing templates for students to add to their personal recipe books as they follow along with the instructions.
- Hold up each ingredient and learn the names for them in English and other spoken languages of the group. Add words to the class word bank.
- Decide on how to split up cooking tasks so that students are all assigned a group to work with.
    - If some students prefer not to cook, offer alternative activities like washing duty, gardening, or creating a recipe document with graphics/art that can be printed and compiled for student recipe books.

Cooking (1 hour)

- If you are using equipment that students are unfamiliar with (like a camping stove), take a few moments to demonstrate how to use it.
- Start cooking! Be sure to start early on the tasks that take the longest time (cooking rice, boiling water, preparing and cooking meat, etc.).

- There is flexibility in your structure! Depending on how often you cook with this group, roles can switch every time. Roles may include: prepping and chopping ingredients, cooking and working at the stoves, and washing dishes.
    - Example: You have a group of 12 students, and you are making pupusas and agua de Jamaica. 2-3 students can prep pupusa fillings; 2-3 students can prep the masa; 1-2 students can make the drink; 2-3 students can make salsa; and the rest can chop ingredients for curtido. As the cooking progresses, the masa and pupusa-filling groups could combine to make the pupusas (but everyone should be given an opportunity to make them if they are

interested in trying), and a couple of students could grill them. Any students who no longer have a role at this point can wash dishes and prep for serving the food.

Eat Together (15 minutes)

- Emphasize the importance of enjoying the meal together so that no one is left working while others eat. This is a great time for informal conversation and community building. If you want to have some conversation starters ready, here are some ideas:
    - Have you tried these foods before? Does it taste the same as what you remember, or different?
    - Does the food remind you of anything?
    - Is this a recipe you would want to bring to your own kitchen?
- Before leaving the table, ask students what recipe(s) we should make next time, and which student(s) will lead the cooking.

Clean (10 minutes)

- There is flexibility in how you do this. You can assign a student or students to dish duty on a rotating basis. You can have each student wash the dishes that they used. It works best if students wash materials as they are cooking, so that the only dishes that need to be washed at the end are the dishes used for serving the food (but remember never to leave a stove unattended).
- Having containers on hand is helpful for distributing leftovers and minimizing food waste.

Resources

Safe Food Handling (web article by the US Food & Drug Administration)

Recipe / Receta: _____

By / Por: _____ Servings / Porciones: _____

Ingredients / Ingredientes:

Include quantities and measurements /
Incluir cantidades y medidas
etc.

Materials / Materiales:

For example: 2 pots, 1 pan, 3 stoves, gloves, etc. /
Por ejemplo: 2 ollas, 1 sartén, 3 estufas, guantes,

Directions / Instrucciones:

Youth Food Justice Leaders Internship

SEATTLE, WASHINGTON

The Youth Food Justice Leaders (YFJL) Internship is an incredible opportunity for youth in the Seattle area to become leaders in their own right by learning about food justice challenges in our complex food system. In summer 2023, the YFJLs of Seattle participated in a Youth Participatory Action Research (YPAR) project empowering young people to conduct research and take action on issues that mattered to them. The youth used the Photo Voice method to document food justice topics and challenges that they saw in their communities through pictures. This work was completed as part of a wider, multi-state project funded by the US Department of Agriculture's Farm to School program.

The Youth Food Justice Internship Program

"We, the Youth Food Justice Leaders of our communities, ask that our school districts, cities, county, and state government officials take the necessary steps towards a more sustainable, equitable, resilient, and healthy food system for all."

The 2023 Summer Internship participants were 11 youth, ages 14-16, from Foster High School in Tukwila and Kentridge High School in Kent. The youth came from a variety of different cultural backgrounds including Burmese, Thai, and Latin American. During the 12-week internship program, the youth participated in 18 lessons about food justice and sustainability, with every lesson inspiring the youth to advocate for change. They learned about key issues in our food system, including the injustices that exist within it. Youth Participatory Action Research provided an opportunity for participants to reflect deeply about how food justice issues impact their own community and to think about potential solutions. The youth built on what they had learned to conduct a photo-based research project illustrating food and sustainability challenges and solutions that they identified in their community.

Step 1: The Research Question

Working in small groups, youth came up with different research questions. As a whole group, they discussed the similarities and differences within each question. They collectively decided to focus on one question: *What changes could be done to our local food system to improve our community and its access to healthy, culturally relevant foods?*

Step 2: Photo Collection and Co-Analysis

Students used their phones to take photos of food justice challenges and solutions in their community. We asked each participant to share with the facilitator up to three pictures along with three hashtags describing each picture. The facilitator then shared the pictures and hashtags to a private Instagram account that could only be viewed by the facilitator and the students who joined the page. For the co-analysis, the youth studied each picture and added more descriptions. Together, the students captured 16 food system issues in their communities. Then, the youth held a full-group discussion to agree on key themes that would be the focus of their research paper.

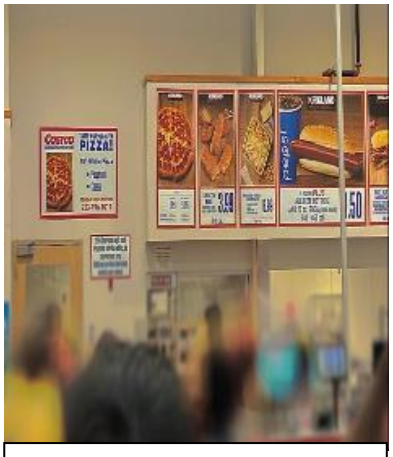
Step 3: Report and Presentation

Combining their food justice education with their findings, the youth set out to create a short one-page group research paper demonstrating what they noticed in their community and what action and change they would like to see. Using a shared document, youth added their comments and recommendations to the different sections of the research paper. Afterwards, the facilitators helped create a summary document that represented collective youth feedback for all the youth who had participated in the project. The document included an introduction, methodology, data collected, and a conclusion. The youth then approved the final document. To ignite real change within their community, the youth mailed the finished research paper to18 government officials with the help of the facilitators.

Student Findings

Together, the youth decided to focus on three main themes.

Farmer's Markets
#eatlocal #freshproduce #agriculture #gardeners



Unhealthy Advertising
#advertisements #affordable #unhealthy

Sustainability
#compost #sustainability #zerowaste #nutrients

"We have captured photos that show unhealthy examples of our food system. In contrast with the helpful, sustainable examples used to benefit our local food system. These images can help develop an understanding of how we can change our approach to positively benefiting the food system."

"We want this project to increase awareness of the issues that we see in our local food systems, ask that the right steps are taken to create more equitable access to affordable, healthy, culturally relevant foods, as well as increasing sustainable practices that help our planet during the climate crisis that our generation is facing."

Key Learnings for Youth Food Justice Facilitators

Over the course of 12 weeks working with the Youth Food Justice Leaders, we (the internship facilitators) gained some key takeaways that we hope can be helpful to others who want to implement similar projects in their own communities.

1. **Give all the voice and power to the youth.** Facilitators are there only for support and guidance through the project.
2. **Provide youth with a few examples** of what they are looking for, in order to help them identify what they can find in their community. For example, we pointed out sustainable practices being conducted at the sites of our field trips, and we discussed some of the benefits of farmer's markets.
3. **Provide space for youth to ask questions**, and offer support on how to identify issues they see in the community.
4. **Make this a one-group project,** allowing for small group discussions, but coming to final decisions (such as research question) as a whole group. If the group includes more than 12 youth, consider making two groups.
5. **Empower youth through this project.** Make them aware that their work could have positive real-world impacts. In our project, sending the research paper to government officials confirmed to youth that their voices were being heard, and that they could take meaningful action toward the change that they wanted in their community. But there are many other options. For example, if your YPAR project focuses on healthy and unhealthy school lunches, then sending the project to the school superintendent, principals, and other school district leaders would be an appropriate way to make actionable change based on youth-led research.

To learn more about YPAR, we recommend these two key resources:

Berkley YPAR Hub

MYAN Main Youth Action Network

Farm-to-School Procurement Handbook

SALT LAKE CITY, UTAH

This Farm-to-School Procurement Handbook was developed by New Roots SLC, a refugee farm incubator program based at the IRC program office in Salt Lake City, Utah. New Roots SLC supports refugee farmers in establishing farm businesses and accessing local markets, including farm-to-school sales. This handbook details how New Roots SLC engaged with schools to develop procurement strategies, fostered successful partnerships between farmers and schools, and aggregated produce from refugee farmers for farm-to-school sales. Whether you are just beginning to explore farm-to-school initiatives or looking to improve existing programs, this handbook offers valuable insights and resources to help navigate the complexities of school food procurement while promoting local food systems, community health, and economic empowerment for refugee farmers.

This guide includes best practices and lessons learned from several stages of the farm-to-school procurement process:

- **Stage 1: Learning and Analysis**
- **Stage 2: Outreach and Relationship Development**
- **Stage 3: Contract Development**
  - Establishing Expectations with Schools
  - Establishing Expectations with Farmers
  - Developing Flexible Contracts
- **Stage 4: Weekly Logistics During the Growing Season**
  - Working with Schools
  - Working with Farmers
  - Managing Payments
- **Stage 5: Continued Engagement and Outreach**
- **Resources**

Stage 1: Learning & Analysis

1. **Find and connect to a local food advocacy organization that is actively working to get locally-grown food into schools.** This can provide valuable insights and resources as you begin developing your strategy for engaging in school food procurement.
2. **Engage with the organization by joining their task forces and working groups.** This involvement will allow you to advocate for local food initiatives and learn best practices for engaging with schools from other members and experts in the field.
3. **Conduct a school district analysis to identify which schools to target for local food initiatives.**
4. **Pursue USDA GAP food safety certification** to help participating farmers demonstrate to schools that they are growing their fruits and vegetables according to Good Agricultural Practices (GAP).

How We Did It

In Salt Lake City, the organization facilitating this movement was the Utah State Board of Education's Farm to Fork Taskforce. New Roots SLC staff attended meetings, hosted meetings at IRC Salt Lake City sites, and actively disseminated information to stakeholders.

New Roots SLC staff collaborated with the taskforce to develop promotional materials, revise their website, and participate in informational sessions at farm events.

During Salt Lake City's collaboration with the Utah Farm to Fork task group, a school district analysis compared various factors, including: enrollment numbers, schools' service areas, and the percentage of students receiving free and reduced lunch.

New Roots SLC pursued GroupGAP certification at our 13-acre Wheadon farm site, meeting requirements from several school districts for farm-to-school sales. To do this, we developed a full food safety plan, produce recall plan, and food safety training and protocols, ensuring compliance with GAP and FSMA food safety standards.

Stage 2: Outreach & Relationship Development

1. **Compile contact lists for schools.** Begin by gathering contact information for public schools, charter schools, and childcare centers in your target area.
2. **Begin building relationships through calls and emails.** Reach out to the contacts on your list to introduce your program and its benefits.
    - Meet with the school food director to discuss collaboration and program integration.
    - Seek out school food days, conferences, and other events where you can build connections with potential partners.
3. **Keep notes on the status of each contact.** While conducting outreach, take detailed notes on each school's receptivity to purchasing local foods. Note their interest level, any concerns they may have, details about meal preparation and food distribution at that school, and their readiness to engage with your program.
4. **Once a connection is made, continue to cultivate the relationship.** Maintain regular communication through calls, emails, in-person meetings, and follow-ups. This ongoing engagement builds trust and helps keep the school interested and committed to the program.

How We Did It

In Salt Lake City's Jordan School District, New Roots SLC initially targeted smaller schools and three specific low-income schools, and later expanded from there.

Several methods of outreach and relationship building were successful in Salt Lake City. New Roots SLC participated in Apple Crunch Days, where local farmers brought apples to schools during the harvest season in October. If apples do not grow in your local area, consider bringing other late summer and fall produce to serve as raw vegetable snacks.

New Roots SLC also sent staff to school nutrition conferences twice a year to engage with local school staff.

Sample Infographic

New Roots SLC developed colorful email attachments to help build interest in the program at schools that were less familiar with local food procurement.

Stage 3: Contract Development

Establish Expectations with Schools

When thinking through policies and processes for school purchasing, it's important to think through several key logistics.

1. **Schedule deliveries for set days each week.**
2. **Establish who will make the deliveries.**
3. **Consider the capacity of your delivery vehicles when determining order amounts.** Take into account the size and capacity of your delivery vehicles to ensure they can handle order volume without issues.
4. **Establish a delivery radius for your service area.** Implement a delivery fee for orders outside this radius. Use the standard IRS mileage rate to calculate this fee.
5. **Set order minimums to ensure cost efficiency.**
6. **Once a school or district expresses interest in purchasing produce, collaborate with them to create a tailored ordering system.** This system will be designed to meet their specific needs and ensure a smooth and efficient process for ordering, delivering, and receiving the produce.

How We Did It

New Roots SLC deliveries were made on Tuesdays and Fridays before 10:00 a.m. Deliveries were made by New Roots program staff and farmers.

New Roots SLC set an order minimum of $100 for delivery orders. This was calculated based on travel costs and the staff time needed for farmer support, order preparation, and delivery.

Frequently Asked Questions from Schools

The following is a list of the typical questions that interested schools frequently asked New Roots SLC.

Do you have a minimum amount, volume, or dollar value for orders?
Our minimum order amount is $50. Our minimum order amount for delivery is $100.
Do you deliver? If so, do you have a maximum distance you are willing to travel? Is there a delivery charge?
We offer deliveries before 10:00 a.m. on Tuesdays and Fridays. We are open to offering additional delivery days for special requests or if enough districts request it. We offer free delivery for orders within a 20-mile radius of our farm at [address]. For deliveries outside the 20-mile radius, a fee of $0.54 per mile will be added to the order.
Are you able to deliver to multiple schools within a district?
While we prefer delivering to a distribution warehouse, we can deliver to 2-3 schools within a district, as long as the orders for each school are over $100. If the second school is within a mile of the first school, orders can be combined ($50 order for School 1 and $50 order for School 2).
Do you allow pick-up directly from the farm?
Yes, we allow pickup from either [address 1] or [address 2].
How frequently can customers place orders? What ordering method do you prefer?
There are several options for placing orders with New Roots. Hopefully one of the following methods suits you. If not, we are happy to work out an arrangement that accommodates your district's needs and our farmers' needs. • Forward Agreement: Before the growing season begins, we will meet to discuss crops we can plant for you. Whether that is 10-20 pound flats of tomatoes each week for a month or one delivery of cherry tomatoes for every school in the district in the month of August, we can figure out a way to meet your needs. If we can't meet the needs of a crop for the whole district, we could provide produce to a couple of schools each week and rotate throughout the district! • Weekly orders through our online order form: Every Monday morning an order form is sent out with a list of produce we will have ready for delivery the following week. Deliveries are made on Tuesdays and Fridays before 10:00 a.m. • Email New Roots: Have a special event coming up or have a last-minute request? Don't hesitate to reach out to [Name], our New Roots Market Coordinator with special requests.

What products and volume of product are you interested in selling?

We are currently building crop plans and have expanded land specifically for school districts. We could even dedicate certain beds to your district's produce needs, so our volume capabilities are dependent on your interest and procurement requirements. New Roots can grow the following items for local school districts:

- Carrots
- Salad Mix
- Radishes
- Cucumbers
- Zucchini and Yellow Squash
- Cherry Tomatoes
- Slicing Tomatoes
- Peppers
- Green Beans
- Broccoli
- Cauliflower
- Potatoes

How will products be packaged? Are you willing to accommodate the needs of the school buyer?

We would like to know what works best for you and your warehouse or cafeterias. Our goal is to make deliveries in sanitized, reusable crates to reduce waste. However, we understand the logistical complications associated with returning crates, so we do have cardboard produce boxes and tomato flats available if necessary. During the planning meeting, we hope to discuss packaging increments that suit your needs.

What is your policy if the product does not meet customer needs?

If you receive an order with items that are not to standard, please contact [contact info] as soon as possible. We handle these situations on a case-by-case basis and will work with you to provide the best quality possible.

How do I verify the food is safe?

New Roots staff have received third-party Produce Safety Alliance (PSA) trainings and certifications through [details]. We lead produce safety workshops with farmers each winter and throughout the growing season. We follow strict organic growing practices, although we have opted not to participate in the National Organic certification program, which requires a costly formal certification and does not focus on food safety. We encourage you to perform your own audit of our farms. We have also worked with a number of school districts to complete the Checklist for Retail Purchasing of Local Produce developed by Iowa State University Extension Services.

Establish Expectations with Farmers

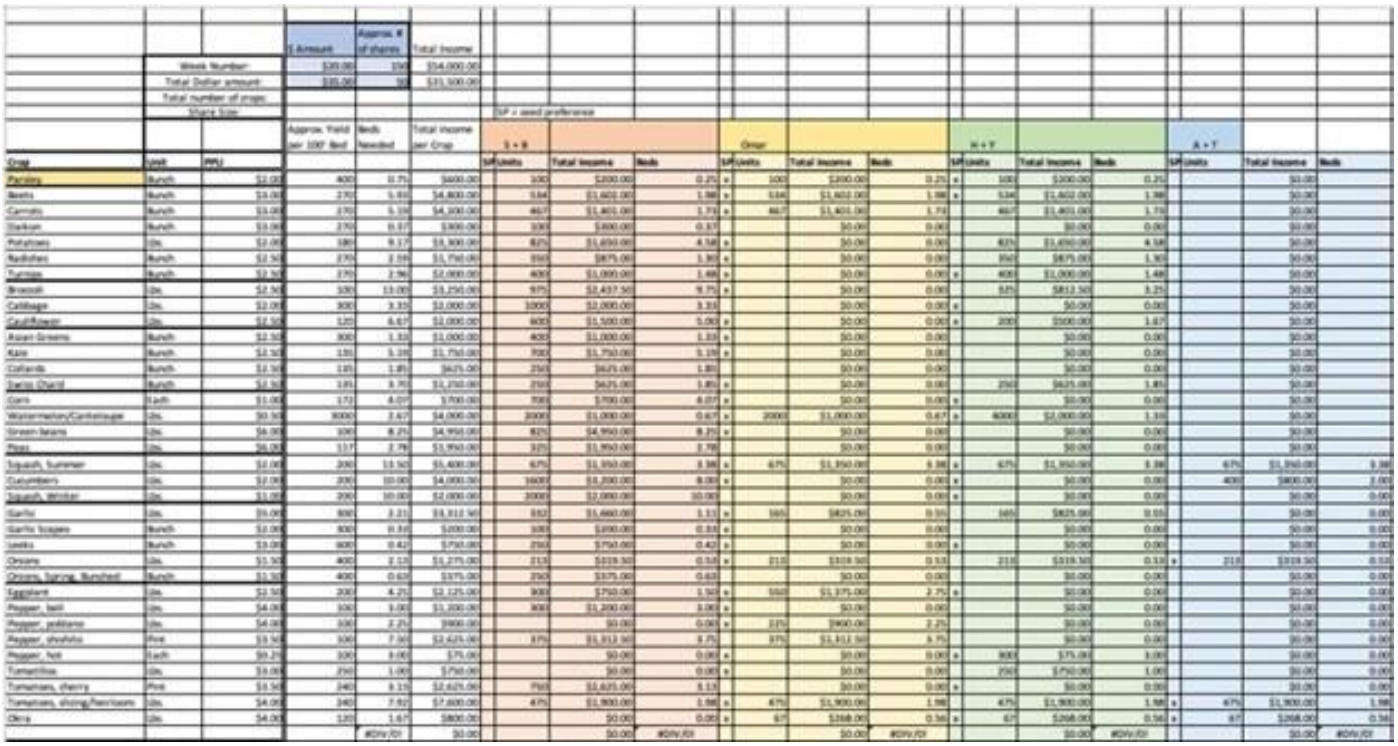
Engage with farmers during the winter months or slower periods to determine their interest and capacity for farm-to-school wholesale orders. In order to accommodate farm-to-school orders, farmers may need to adjust crop planning. Several small farmers can work together to fill farm-to-school orders as a group.

The example below showcases an aggregated Community Supported Agriculture (CAS) crop plan, which involved detailed planning of allocations between four farmers. This approach required a thorough analysis due to the smaller volume of orders, which could largely be met by available excess yields or by farmers being flexible with their farmers market allocations.

How We Did It

During the winter months, New Roots SLC collaborated closely with farmers to gauge their interest and capacity for farm-to-school wholesale orders. This planning process was integrated with our general crop planning efforts, allowing us to align school district purchasing desires with farmer interest in growing specific crop varieties. We integrated farm-to-school crop planning with plans for other sales avenues, such as farmers markets. This comprehensive planning approach ensured that all aspects of our crop production were aligned and optimized.

Example of an Aggregated Crop Plan with Multiple Farmers Contributing



Develop Flexible Contracts

Flexibility is key to accommodating the needs of schools and school districts. This flexibility might involve accommodating different order sizes, providing alternatives when needs could not be met for the whole school district, and breaking up order quantities into different delivery weeks.

Example of a New Roots SLC Vendor Bid from a School District

Produce Grower:
Contact Information:
If you are interested in providing [DISTRICT] with any of the following items, please send quotes by [DEADLINE].
These dates are approximate as we work through the growing season.
Note: We are also willing to break up quantities into different delivery weeks and or address creative solutions that will support the needs of our local farmers and the district.
Also send quotes and approximate harvest dates for any additional items/products you would like us to consider.
Any unacceptable product must be replaced by provider at no additional expense to the District.
Produce must be delivered each week to [DELIVERY LOCATION] on [Monday 6:00am to 3:00pm or the next morning before 6:00am]. On a holiday weekend when the district is closed on Monday, all produce deliveries must be received before 6:00am Tuesday
Any supplier must be able to work through the district purchase order and Nutrition Services ordering system.
All produce providers must be willing to provide proof of liability insurance and necessary food safety information and/or GAP certification.
Note: [We only have 5 year round schools this year which opened on July 25th and our remaining schools start on Aug 22nd.]

Thank you,

[CONTACT PERSON 1, DIRECTOR]

[CONTACT PERSON 2]

How We Did It

New Roots SLC found that it was important to be flexible in working with schools and districts to accommodate changing needs and conditions.

For example, we found ways to accommodate different order sizes. Whether the request was for 10-20 pound flats of tomatoes each week for a month or for single delivery of cherry tomatoes for every school in the district during the month of August, New Roots SLC worked to meet these varying needs.

New Roots SLC worked hard to provide alternatives when full district needs could not be met. If New Roots SLC could not supply a crop for the entire district, we offered a solution by providing produce to a few schools each week, rotating throughout the district to ensure that as many schools as possible received fresh produce.

Stage 4: Weekly Logistics During the Growing Season

Working with Schools

Clear and consistent communication is key to maintaining relationships with schools and school districts.

- **Send produce availability to schools on a weekly basis.** Consistent communication helps schools know what to expect.

How We Did It

Every Monday morning, New Roots SLC sent out an order form listing the produce that would be available for the following week. This was done even for schools that were forward contracted, ensuring that they were aware of the available options and any fluctuation from the contract.

Example of a School District Produce Form

Summer session, to year round schools – [# of schools]

School District		Farmer		
Produce Item	Quantity [District]	y Dates	requency	Cost
Cherry tomatoes	[5-10 flats of 12 pint containers]			
Lettuce, Spring Mix				
Radishes				
Cucumbers				
Corn on the cob				
Pears				

All schools are in session – [# of schools]

School District		Farmer		
Produce Item	Quantity [District]	y Dates	requency	Cost
Corn on the cob				
Watermelon				
Cantaloupe				
Raspberries				
Lettuce, Spring Mix (Secondary Schools Only)				
Radishes (Secondary Schools Only)				
Cherry tomatoes (Secondary Schools Only)				
Peaches				
Apples (different sizing will be considered and apples may be offered numerous days)				
Spaghetti Squash				

Other items [DISTRICT NAME] would be interested in seasonally:

School District		Farmer		
Produce Item	Quantity [District]	ailability Da	requency	Cost
Bell Peppers				
Broccoli				
Cabbage, Green				
Cabbage, Red				
Carrots				
Cauliflower				
Celery				
Honeydew				
Nectarines				
New Potatoes				
Onions				
Sugar Snap Peas				
Tomaotes, Slicing				

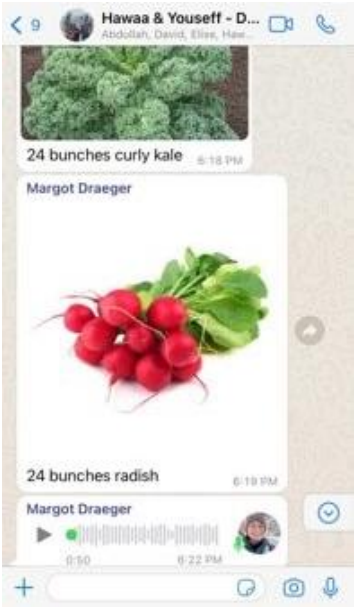
Working with Farmers

- **Provide information on order requests to farmers for harvest and wash-pack.** Take into account farmers' language needs and preferred means of communication.
- **Set harvest days each week for the farmers.** Establish specific days each week dedicated to harvesting produce. This helps ensure a consistent supply of fresh produce for delivery.
- **Set delivery days.** Schedule specific delivery days, such as twice a week, to ensure timely and reliable distribution of produce to the schools.
- **Establish a timeline and expectations with farmers for packing and labeling all orders.** Work with farmers to set clear guidelines and timelines for packing and labeling produce. For example, specify that each order should include 24 kale bunches per crate. This helps maintain consistency and quality across all deliveries.

How We Did It

New Roots SLC works with many farmers whose first language is not English, or who have different levels of literacy. We found it effective to send harvest requests to farmers via WhatsApp. These requests included pictures of each vegetable, the quantity needed, and voice memos for farmers who did not read either in English or in their native language. This approached helped ensure clear communication and accurate fulfillment of orders.

Examples of Harvest Requests to Farmers



Example of Produce Ready for Delivery

Work with farmers to make sure produce is:

- Washed
- Packed into uniform amounts
- Labeled
- Placed in cold storage

Managing Payments

- Develop a system to track produce and payments to farmers.
- Invoice schools according to the timeline set in the contract.
- Make timely payments to farmers according to an agreed-upon schedule.

Example of Allocation and Total Pay for 2 Weeks for 3 Farmers

Ordered Date	Farmer Name	Category	Buyer Name	Crop	Account	Total Owed
10-Sep-22	Nathaniel	Markets	Sunnyvale Farmers Market			$11.00
17-Sep-22	Nathaniel	Markets	Sunnyvale Farmers Market			$233.00
10-Sep-22	Nathaniel	HUD CV Grant	Emergency Food Assistance (EFA)			$31.80
17-Sep-22	Nathaniel	HUD CV Grant	Emergency Food Assistance (EFA)			$51.00
7-Sep-22	Nathaniel	CSA	Week 11	Cabbage		$50.00
		Gross Total				$376.80
		Market Fee				-$9.00
		CSA 30% Fee				-$15.00
		Farm Fee Payment				$0.00
22-Sep	Nathaniel		Nathaniel		TR351	$352.80
Ordered Date	Farmer Name	Category	Buyer Name	Crop	Account	Total Owed
10-Sep-22	Odette	Markets	Sunnyvale Farmers Market			$238.00
17-Sep-22	Odette	Markets	Sunnyvale Farmers Market			$262.00
10-Sep-22	Odette	HUD CV Grant	Emergency Food Assistance (EFA)			$202.30
17-Sep-22	Odette	HUD CV Grant	Emergency Food Assistance (EFA)			$125.25
		Gross Total				$827.55
		Market Fee				-$12.00
		CSA 30% Fee				$0.00
		Farm Fee Payment				$0.00
22-Sep	Odette		Odette		TR351	$815.55
Ordered Date	Farmer Name	Category	Buyer Name	Crop	Account	Total Owed
17-Sep-22	Omar	Markets	Sunnyvale Farmers Market			$153.00
10-Sep-22	Omar	HUD CV Grant	Emergency Food Assistance (EFA)			$316.00
17-Sep-22	Omar	HUD CV Grant	Emergency Food Assistance (EFA)			$151.20
7-Sep-22	Omar	CSA	Week 11			$827.38
14-Sep-22	Omar	CSA	Week 12			$1,431.66

How We Did It

New Roots SLC worked with a group of several farmers to full school orders. Each farmer provided different types and amounts of produce each week, and needed to be paid accordingly. New Roots SLC developed a spreadsheet to track this aggregation.

Farmer allocations for each item provided were recorded manually. This information was entered into a spreadsheet that calculated the total amounts owed to each farmer. Payments to farmers were made by check every two weeks, ensuring timely compensation for their produce.

New Roots SLC created invoices for school orders using Zoho Invoice. This software provided a convenient and efficient way to generate and manage invoices, ensuring accurate billing, aggregation of farmers' produce, and payment tracking for all school orders.

Stage 5: Continued Engagement and Outreach

Outreach and community engagement continue throughout the life of the program.

- **Once a successful model is developed, share it with other districts.** This can help demonstrate the effectiveness of your program and encourage other districts to consider similar initiatives.
- **Conduct outreach activities at schools with existing contracts.**
- **Encourage schools to contact your program at any time.**

How We Did It

New Roots SLC conducted outreach activities at schools with existing contracts, such as "Meet Your Farmer Days." These events allowed farmers to meet with students and staff, offering produce samples and fostering connections between schools and local producers.

New Roots SLC encouraged open communication with schools on an ongoing basis. This allowed for easy engagement and information sharing between New Roots SLC and potential new partner schools. New Roots SLC also sent emails to new or prospective schools to highlight available crops and generate interest in the program.

Resources

New Roots SLC worked closely with Utah Farm-to-Fork taskforce to develop many resources specific to Utah school sales, and relied on USDA farm-to-school and nationwide resources as well. We used the USDA's Farm-to-School training and technical assistance materials to develop best practices for food safety and procurement for New Roots farmers, and to make recommendations for improvements to the Utah Farm-to-Fork Taskforce website. Staff utilized resources such as the Checklist for Retail Purchasing of Local Fresh Produce and the Farm-to-School Produce pack size chart as they developed forward-contracting agreements with school districts.

Resources for producers

- Farm to School Produce Pack Size Chart from Washington State Department of Agriculture
- Farm to School Producer Toolkit from Illinois Farm to School Network
- Wisconsin Farm to School Toolkit for School Nutrition Programs from University of Wisconsin-Madison
- Checklist for Retail Purchasing of Local Produce from Iowa State University Extension and Outreach

Resources for school districts

- Food Safety Checklists from Utah Farm to Fork
- Cafeteria signs from Utah Farm to Fork
- Templates and guides for purchasing from local producers, from Utah Farm to Fork

CONTACT US

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