



Memorandum of Understanding (MoU)
North Slope School District
&
The Fairbanks Soil and Water Conservation District

This Memorandum of Understanding (MoU) signifies a cooperative agreement between The North Slope School District (NSSD) and the Fairbanks Soil and Water Conservation District (FSWCD) to organize hydroponic tower workshops jointly. The central objective of this collaboration is to provide a platform for education and hands-on learning experiences in hydroponic agriculture. Through these workshops, students, educators, and community members within NSSD will gain practical insights into hydroponic systems, sustainable farming practices, and water conservation. By leveraging the expertise of both districts, this MoU aims to foster environmental awareness, build community engagement, and enhance educational programs.

The MoU outlines the shared commitment of NSSD and FSWCD to promote sustainable agricultural practices and resource management. It envisions collaborative research projects, exchanging knowledge and resources, and developing valuable skills among participants. This agreement not only expands educational horizons but also paves the way for potential future partnerships.

Point of Contact

To facilitate collaboration between the two organizations, we designate the following individuals as Point of Contact (POC), while agreeing that if the assigned staff member changes, the host organization will contact the other to provide contact information for the new POC.

Fairbanks Soil and Water Conservation District Point of Contact:

Name:	Scott Faulkner
Title:	Natural Resources Educator
Email:	scott.fswcd@gmail.com
Phone:	(907) 322-4999

Fairbanks Soil and Water Conservation District Point of Contact:

Name:	Mel Sikes
Title:	Natural Resources Educator
Email:	mel.fswcd@gmail.com
Phone:	(907) 347-1802

North Slope School District Point of Contact:

Name:	MJ Geiser
Title:	CTE Director
Email:	maryjane.geiser@nsbsd.org
Phone:	(907) 852-9742



North Slope School District will:

1. Prearrange flight schedules with FSWCD personnel:
 1. Scott Faulkner
 2. Melissa Sykes
 3. Emily Cheney
- Purchase flights from and return to Fairbanks International Airport via Utqiagvik Airport
 - 2 Round-trip flights for each person listed above for the following dates:
 - Middle School Workshop
 - September 24, 2023- Depart Fairbanks to Utqiagvik
 - September 29, 2023- Emily Depart Utqiagvik to Fairbanks
 - September 30, 2023- Scott and Melissa Depart Utqiagvik to Fairbanks
 - High School Workshop
 - November 12, 2023- Depart Fairbanks to Utqiagvik
 - November 18, 2023- Depart Utqiagvik to Fairbanks
2. Provide classroom space
3. Provide lodging
4. Provide a full-time classroom attendant to monitor student behavior
5. Provide kitchen space, including refrigerator and freezer
6. If necessary, provide transportation to and from the Utqiagvik airport
7. Purchase materials and arrange delivery to Utqiagvik
8. Print student workbook materials

Fairbanks Soil and Water Conservation District will:

1. Provide three instructors for two, 5-day hydroponic workshops
2. Provide 6-hours of instruction and supervised hands-on activities each day
3. Send an electronic copy of the student workbook to NSSD personnel for printing
4. Provide tools to construct hydroponic systems
5. Provide a materials list of items to purchase, vendor names, and price estimates.
6. Direct students in constructing and operating 2 60-grow site, school-based, Deep-Water Culture (DWC) hydroponic units.
7. Direct students in constructing and operating 40 student hydroponic tower units.
8. Provide meals, drinks, and snacks for the three FSWCD employees throughout the workshop term.

Term of Agreement

This agreement shall be effective as of the date of signing by both parties and shall continue until modified or replaced at the discretion of either party. To modify or replace the agreement, an agency must provide 30 days written notice.



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Attachment A: Signature of Authorized Agent

This Memorandum of Understanding (MOU) is a testament to the collaborative partnership between the Fairbanks Soil and Water Conservation District and the North Slope School District. With a shared commitment to fostering sustainable agricultural practices and promoting experiential learning, both parties acknowledge their mutual agreement to undertake two hydroponic workshops. Through this MOU, the participating entities solidify their dedication to the outlined objectives, activities, and timelines in the agreement. By affixing their signatures below, the Fairbanks Soil and Water Conservation District and the North Slope School District affirm their readiness to engage in a fruitful collaboration that will enrich educational opportunities and advance ecological awareness and agricultural knowledge within the community.

FOR NORTH SLOPE SCHOOL DISTRICT:

Mary Jane Geiser, NSSD CTE Director

_____ **Date** _____

FOR FAIRBANKS SOIL AND WATER CONSERVATION DISTRICT:

Joni Scharfenberg, FSWCD Coordinator

_____ **Date** _____

Attachment B: Scope of Work

Fairbanks Soil and Water Conservation District
North Slope School District, Utqiagvik Intensive Hydroponics Workshops
Scope of Work: 2023/2024 School Year

I. BACKGROUND

The Fairbanks Soil and Water Conservation District promotes sustainable land development and works with private landowners to address their natural resource concerns. By partnering with local, state, and federal organizations, the FSWCD provides education and technical assistance to private landowners with soil, agriculture, water, invasive species, forestry, land development, and other related natural resource issues.

The district serves over 600 cooperators and the general public in an area that covers 30,113,580 acres of Interior Alaska, promoting wise development and conservation of natural resources. FSWCD provides technical and educational support to a variety of partners and the public, to help them accomplish their conservation goals:

1. A viable agricultural community
2. Conservation of soil resources
3. Maintenance of water quality
4. Sustainable management of forest resources
5. Prevention & eradication of noxious & invasive species
6. Affordable energy
7. Relevant education and information for all clientele

In an effort to serve individuals and communities, FSWCD has implemented several methods to deliver helpful information. FSWCD is heavily involved in Agriculture in the Classroom (AIRC). Mel Sikes, FSWCD's Natural Resource Educator, serves as the program leader for AIRC in Alaska. The program was instrumental in FSWCD staff learning about hydroponics and developing and adapting lessons to serve all Alaskans.

State-operated programs implement Agriculture in the Classroom programs. National Agriculture in the Classroom supports state programs by providing a network that seeks to improve agricultural literacy — awareness, knowledge, and appreciation — among PreK-12 teachers and their students. Agriculture in the Classroom (AIRC) programs seek to improve student achievement by applying authentic, agricultural-based content as the context to teach core curriculum concepts in science, social studies, language arts, and nutrition. By encouraging teachers to embed agriculture into their classrooms, AIRC cultivates an understanding and appreciation of the food and fiber system that we

all rely on. AITC is the lead organization serving the full spectrum of K-12 formal education.

Programs under the Agriculture in the Classroom umbrella often involve a combination of classroom lessons, field trips to farms or agricultural facilities, interactive activities, and educational resources for teachers. These initiatives aim to make learning about agriculture engaging and relevant to student's everyday lives, fostering a better understanding of the challenges and opportunities in the agricultural sector.

The goal of Alaska Agriculture in the Classroom is to foster a deeper understanding of where food comes from, the challenges farmers face in Alaska, and the significance of agriculture to the state's overall well-being. It aims to bridge the gap between urban and rural communities, promote agricultural literacy, and inspire an appreciation for the importance of local food systems, especially through hydroponics.

Hydroponics involves cultivating plants in nutrient-enriched water, devoid of soil, making it a viable approach for both terrestrial and aquatic plant growth. Typically, an inert medium like perlite is employed to stabilize the plants. Hydroponics is a way to grow crops year-round and provide a steady supply of nutritious and delicious produce.

II. 2023/2024 INTENSIVE HYDROPONIC WORKSHOPS

FSWCD personnel endeavor to empower North Slope Borough School District students through four steps.

1. **Teaching to Students:** The instructor introduces hydroponics, hydroponic system construction, botany, growing plants, and the relationship between the students and their communities. This involves explaining the key points, providing examples, and setting the context for their learning.
2. **Demonstrating to Students:** After introducing the topic, the instructor demonstrates how to construct systems and grow plants. This will involve practical examples, visual aids, and hands-on demonstrations.
3. **Students Do:** This step is about active participation. Students can apply the knowledge and build their own hydroponic tower and a system within the school. It will involve discussions and problem-solving activities.
4. **Students Teach Back and Demonstrate:** In this final step, students become teachers. They will be asked to explain what they've learned to their peers, teachers, and elders from the community. Additionally, students will be asked to take what they have learned and share it in their communities.

Dates:

North Slope Borough School District Middle School Intensive Hydroponic Workshop
September 25-29, 2023
Utqiagvik, Alaska

North Slope Borough School District High School Intensive Hydroponic Workshop
November 13-17, 2023
Utqiagvik, Alaska

III. PURPOSE AND OBJECTIVES

Purpose:

The purpose of our week-long intensive hydroponics courses for junior and high school students in a remote Alaska village is to empower and inspire the next generation with sustainable agricultural skills. Through hands-on learning and interactive sessions, we aim to foster an understanding of hydroponic techniques, enabling students to cultivate fresh produce in challenging Arctic conditions while promoting food security and environmental consciousness within their community. By combining scientific knowledge with practical experience, our course seeks to cultivate a sense of innovation and responsibility, equipping students to contribute to resilient and resourceful local food systems.

Participants in the Utqiagvik Intensive Hydroponics Workshops will develop an understanding of basic hydroponics. Areas that will be covered include:

- **Introduction to Hydroponics:** Understanding what hydroponics is and how it differs from traditional soil-based gardening.
- **Plant Growth:** Exploring the basic needs of plants, including water, nutrients, light, and oxygen, and how these elements interact in a hydroponic system.
- **Types of Hydroponic Systems:** Learning about various hydroponic systems such as deep-water culture, nutrient film technique, wick system, etc.
- **Nutrient Solutions:** Studying the importance of nutrient solutions and how to create a balanced solution that provides plants with essential macro and micronutrients.
- **pH and EC Levels:** Understanding the significance of pH (acidity/alkalinity) and Electrical Conductivity (EC) in maintaining proper nutrient uptake by plants.
- **Plant Selection:** Choosing suitable plants for hydroponic cultivation based on growth rate, space requirements, and climate considerations.
- **Lighting:** Exploring the role of light in plant growth, the differences between natural and artificial light sources, and the importance of light intensity and spectrum.
- **System Disease Management:** Learning about maintaining a clean environment in hydroponic systems to prevent diseases and pests.



- **Water Management:** Understanding how to manage water levels, quality, and circulation within hydroponic systems.
- **Observation and Data Collection:** Emphasizing the importance of monitoring plant growth, measuring nutrient levels, and keeping records to make informed decisions for optimal hydroponic cultivation.

Furthermore, participants in the Utqiagvik Intensive Hydroponics Workshops will develop an understanding of introductory botany. Areas that will be covered include:

- **Plant Structure:** Students learn about the different parts of a plant, including roots, stems, leaves, flowers, and fruits. They understand the functions of each part and how they contribute to the plant's overall growth and survival.
- **Photosynthesis:** Students are introduced to photosynthesis, where plants use sunlight, water, and carbon dioxide to produce glucose (energy) and oxygen. They grasp the importance of chlorophyll in this process.
- **Plant Reproduction:** This topic covers sexual and asexual plant reproduction. Students learn about pollination, fertilization, seed formation, and the role of flowers in the reproductive process.
- **Seed Dispersal:** Students study how plants disperse their seeds, including wind, water, animals, and self-propulsion mechanisms. They understand the advantages of seed dispersal for plant survival and propagation.
- **Plant Growth and Development:** Students explore how plants grow and develop over their lifecycles. They learn about the stages of germination, growth, flowering, and fruit production.
- **Plant Adaptations:** Students understand how plants adapt to their environments. They learn about adaptations such as thorns, spines, leaves modified for storage, and adaptations to different climates.
- **Plant Hormones:** Students are introduced to plant hormones like auxins, gibberellins, and cytokinin. They learn how these chemicals regulate plant growth, development, and responses to external stimuli.
- **Ecological Importance:** Students explore the role of plants in ecosystems. They learn how plants provide oxygen, food, shelter, and habitat for other organisms, and how they contribute to maintaining the balance of ecosystems.
- **Plant Diseases:** Students are introduced to common plant diseases caused by fungi, bacteria, and viruses. They learn about symptoms, prevention, and basic methods of controlling these diseases.
- **Plant Classification:** Students gain a basic understanding of plant taxonomy and classification. They learn about the main groups of plants, including angiosperms (flowering plants) and gymnosperms (conifers), and how plants are categorized based on characteristics.

Objectives:



FSWCD will complete the following actions:

1. Plan, design, and implement a 5-day intensive workshop centered on **middle school** students from outlying Alaskan communities. The workshop will emphasize a broad look at hydroponics, hydroponic system construction, operation and maintenance, and introductory botany. The workshop will be given in Utqiagvik.
2. Plan, design, and implement a 5-day intensive workshop centered on **high school** students from outlying Alaskan communities. The workshop will emphasize a broad look at hydroponics, hydroponic system construction, operation and maintenance, and introductory botany. The workshop will be given in Utqiagvik.
3. Accommodate up to 20 middle school and 20 high school students in two intensive hydroponic workshops.
4. Construct and start 2 school-based 60-Growsite Hydroponic systems with students. The first will be completed during the middle school workshop. The second will be completed during the high school workshop.
5. Assist students in constructing the FSWCD Student Hydroponic Towers. Completed Student Towers can be transported on small aircraft via a fully contained duffel bag.
6. Promote discussions to explore careers and educational pathways to examine hydroponics and food systems further.
7. Invite local elders to meet with students and discuss local food systems. Students will share what they have learned and experienced throughout the weeklong workshop.
8. Host a series of ZOOM meetings to meet with workshop participants and their teachers to hear about their experience with their Student Hydroponic Towers, takeaways from the workshops, and questions that may have arisen.



IV. OUTCOMES

The following chart provides details on how the successful completion of the objectives will be measured.

Objectives	Outcome Measures
1. Middle School Hydroponic Workshop	• Up to 30 Hours of classroom time Instruction • Hands-on Activities and Projects
2. High School Hydroponic Workshop	• Up to 30 Hours of classroom time Instruction • Hands-on Activities and Projects
3. Student Participation	• Up to 20 Middle School Students participate in Workshop • Up to 20 High School Students participate in Workshop
4. School-based Hydroponic System	• 2 60-Growsite Hydroponics systems built and operational
5. Student Hydroponic Towers	• Up to 40 16-Growsite Student Hydroponic Towers Constructed and distributed to hub villages.
6. Hydroponics Career Exploration	• Discussion of 10 or more careers that involve hydroponics.
7. Human Interactions	• Students will interact with 2 or more local elders to connect with community practices related to food security and fresh vegetables. • Students will educate the public on the purpose and function of the workshop and projects through interactions.
8. Student Follow-up	• 6- 1-Hour ZOOM Visits to answer questions, monitor student progress, and encourage further involvement in hydroponics or related areas

V. TIMELINE

All projects are contingent upon factors such as airline and student availability, timely delivery, and condition of supplies.

Tasks	Anticipated Completion Date
Project activities, objectives, and deliverables	
Preparation, gathering workshop materials, finalizing, and confirming plans with Barrow representatives	10/2023
Confirmation of final student count for 2 workshops	9/2023
Delivery of materials for the first workshop to (Wrights Air or Alaska) Airlines	10/2023
Middle School Workshop in Utqiagvik	10/2023
Middle School Workshop follow-up and encouragement group ZOOM	12/2023
Delivery of materials for the second workshop to (Wrights Air or Alaska) Airlines	1/2023
High School Workshop in Utqiagvik	2/2024
High School Workshop follow-up and encouragement group ZOOM	3/2024
Final assessment with NSSD Utqiagvik representatives via ZOOM	5/2024



VI. BUDGET

The budget's estimation relies on fluctuations in material and transportation expenses, along with variations in student participation figures that impact the requirement for small hydroponic towers. FSWCD has set a definitive deadline for submitting participant numbers to ensure all workshop attendees can construct and take a small hydroponic tower home.

Table 1 2023 Utqiagvik Hydroponic Project Budget Items NSSD is responsible for purchasing directly and delivering to the workshop site Phase 1, Middle School Workshop			
1	60 Grow Site Deep Water Culture Complete Hydroponic System Materials & Supplies- (Listed Above, FOB Fairbanks) FOB Fairbanks	\$2,950.00	\$2,950.00
20	Complete Small Hydroponic Tower Kits, FOB Fairbanks	\$350.00	\$7,000.00
20	Manuals and Handouts, Other Printed Material, FOB Fairbanks	\$12.00	\$240.00
3	Travel- Roundtrip Flights from Fairbanks to Utqiagvik (Alaska Airlines)	\$500.00	\$1,500.00
NSSD direct purchase Total			\$11,690.00

Table 2 2023 Utqiagvik Hydroponic Project Budget Items NSSD is responsible for purchasing and delivering to the workshop site Phase 2, High School Workshop			
1	60 Grow Site Deep Water Culture Complete Hydroponic System Materials & Supplies- (Listed Above, FOB Fairbanks) FOB Fairbanks	\$2,950.00	\$2,950.00
20	Complete Small Hydroponic Tower Kits, FOB Fairbanks	\$350.00	\$7,000.00
20	Manuals and Handouts, Other Printed Material, FOB Fairbanks	\$12.00	\$240.00
3	Travel- Roundtrip Flights from Fairbanks to Utqiagvik (Alaska Airlines)	\$500.00	\$1,500.00
NSSD direct purchase Total			\$11,690.00



Table 3 2023 Utqiagvik Hydroponic Project Budget Items NSSD will pay directly to FSWCD			
42	Per Diem (Includes Travel Days, 3 People X 7 days X 2 Visits = 42)	\$60.00	\$2,520.00
40	Labor- Scott/Mel (\$32/hr + 34.32% Fringe = \$42.98/hr) Material & Syllabus Preparation	\$64.47	\$2,578.80
40	Labor- Emily- (\$25/hr + 34.32% Fringe = \$33.58/hr) Material & Syllabus Preparation	\$33.58	\$1,343.20
80	Labor- Mel- (\$32/hr + 34.32% Fringe = \$42.98/hr) 2- 1 Week Barrow Intensive Courses	\$42.98	\$3,438.40
32	OT Labor- Mel- (\$64.47/hr) 2- 1 Week Barrow Intensive Courses	\$64.47	\$2,063.04
80	Labor- Scott- (\$32/hr + 34.32% Fringe = \$42.98/hr) 2- 1 Week Utqiagvik Intensive Courses	\$42.98	\$3,438.40
32	OT Labor- Scott- (\$64.47/hr) 2- 1 Week Utqiagvik Intensive Courses	\$64.47	\$2,063.04
80	Labor- Emily C- (\$25/hr + 34.32% Fringe = \$33.58/hr) 2- 1 Week Utqiagvik Intensive Courses	\$33.58	\$2,686.40
32	OT Labor- Emily C- (\$50.37/hr)	\$50.37	\$1,611.84
20	Labor- Scott- (\$32/hr + 34.32% Fringe = \$42.98/hr) Assistance with NSSD purchasing items, assistance with delivery to Fairbanks airport, etc.	\$42.98	\$859.60
SubTotal			\$22,602.72
FSWCD Administrative			\$2,260.27
Pay to FSWCD Directly, Total			\$24,862.99

Table 4 2023 Utqiagvik Hydroponic Project Budget NSSD Total Budget			
1	Table 1, Items NSSD is responsible for purchasing directly and delivering to the workshop site for the Phase 1, Middle School Workshop	\$11,690.00	\$11,690.00
1	Table 2, Items NSSD is responsible for purchasing directly and delivering to the workshop site for Phase 2, High School Workshop	\$11,690.00	\$11,690.00
1	Table 3, Items NSSD will pay directly to FSWCD	\$24,862.99	\$24,862.99
NSSD Total Budget			\$48,232.99



VII. APPENDIX

Appendix A

Breakdown- 60 Grow Site Deep Water Culture Complete Hydroponic System

QTY	Item Description	Vendor	Unit Price	Total
4	1"x2'x2' Foam Board	Lowes	\$10.00	\$40.00
4	20 Gallon Totes	Lowes	\$25.00	\$100.00
1	24"D x 48"W x 84"H Metal Shelf	Lowes	\$325.00	\$325.00
2	Medium Universal Sled	Wal-Mart, Fred Meyer, Lowes	\$100.00	\$200.00
1	Bootstrap Farmer Plastic 1020 HD	Bootstrap Farmer	\$275.00	\$275.00
3	200pc 1" Rockwool	Amazon	\$20.00	\$60.00
1	20lb Fertilizer, Hydrofeed, 16-4-17	Amazon	\$80.00	\$80.00
2	32-Gallon Rubbermaid Trashcan	Lowes	\$45.00	\$90.00
4	Microbial Packs	Holmtown Nursery	\$65.00	\$260.00
1	Assortment Johnny's Pelleted Lettuce Seeds	Johnny's	\$150.00	\$150.00
2	Air Pump, 1030gph	Amazon	\$50.00	\$100.00
2	Air Pump, 120gph	Amazon	\$20.00	\$40.00
1	100' Air Line	Amazon	\$20.00	\$20.00
12	Air Stones	Amazon	\$7.00	\$84.00
2	Water Pump, 800gpm	Amazon	\$30.00	\$30.00
1	100' Chain	Amazon	\$30.00	\$30.00
1	S-hooks	Amazon	\$12.00	\$12.00
1	8" Zip Ties	Amazon	\$20.00	\$20.00
1	PVC Pipe and Fittings	Lowes	\$50.00	\$50.00
2	Stanley 6 Outlet Powerstrips	Amazon	\$35.00	\$70.00
2	Timers	Amazon	\$10.00	\$20.00
2	Thermometer, Ambient	Amazon	\$10.00	\$20.00
3	Drain Grommets	Amazon	\$8.00	\$24.00
1	20' Drain Hose	Amazon	\$25.00	\$25.00
1	Mylar Roll	Amazon	\$50.00	\$50.00
1	pH and Conductivity pens	Amazon	\$165.00	\$165.00
1	Quantum Par Light Meter	Amazon	\$160.00	\$160.00
1	Nursery (for the top shelf of the system)	Amazon	\$200.00	\$200.00
1	"Compost Tea" System (sits on the bottom shelf next to growing area)	Amazon	\$250.00	\$250.00
Total				\$2,950.00



Appendix B

Breakdown- Small Hydroponic Tower System

QTY	Item Description	Vendor	Unit Price	Total
3	Two Gallon Buckets	Lowes	\$5.00	\$15.00
3	Two Gallon Bucket Lids	Lowes	\$3.00	\$9.00
1	Five Gallon Bucket	Lowes	\$9.00	\$9.00
1	Five Gallon Bucket Lid	Lowes	\$4.00	\$4.00
1	185gpm Submersible Water Pump	Amazon	\$30.00	\$30.00
16	1" 45-degree elbows	Ferguson (Fbx)	\$2.00	\$32.00
6	1" Long, ¼" Stainless Steel Hex Bolts	Lowes, Denali Fastener (Fbx)	\$0.50	\$3.00
6	¼" Stainless Steel Wing Nuts	Lowes, Denali Fastener (Fbx)	\$1.00	\$6.00
1	4' Section of ½" Schedule 40 PVC Pipe	Lowes, Ferguson	\$6.00	\$6.00
1	Funnel, Plastic, 1-1/3 Quart	Fred Meyer	\$5.00	\$5.00
1	Barrina 24" LED Light, Pack of 4	Amazon	\$70.00	\$70.00
8	1" Three Way PVC, Schedule 40, Elbow Sockets	Ferguson (Fbx)	\$6.00	\$48.00
4	10' PVC, Schedule 40, Pipe Section	Lowes, Ferguson	\$10.00	\$40.00
20	Stainless Steel Screws	Lowes, Denali Fastener	\$0.10	\$2.00
1	Power Strip	Amazon	\$8.00	\$8.00
1	Timer	Amazon	\$10.00	\$10.00
20	8" Zip Ties	Amazon	\$0.50	\$10.00
1	Duffel Storage Bag	Amazon	\$25.00	\$25.00
1	Starter kit: Fertilizer, seeds, growing media, 1020 tray	Holmtown Nursery	\$18.00	\$18.00
Tower Parts Total				\$119.00
Lighting Structure and Supplies Total				\$231.00
Small Hydroponic Total				\$350.00

Appendix C



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60-Growsite Hydroponic System





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Student Hydroponic Tower (photo shows additional automation accessories that are not included)





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Links

Fairbanks Soil and Water Main Page

<https://www.fairbankssoilwater.org/index.php>

FSWCD Indoor Gardening Page

<https://www.fairbankssoilwater.org/akaitcindoorgardening.htm>

Alaska Agriculture in the Classroom

<https://www.fairbankssoilwater.org/education-agriculture-classroom.htm>

Johnny's Seeds

<https://www.johnnyseeds.com/>