



You Say Tomato – I Say Tomatosphere

NAITC 2017



Overview

Tomatosphere™

Planting The Seed

Grow A Seed Career

Ambassador Program





First-The Seed Foundation is a not-for-profit organization established in 2008 by the American Seed Trade Association, one of the oldest trade associations in America, to inform today's consumers and tomorrow's workforce about the importance of the seed industry.

Our Mission

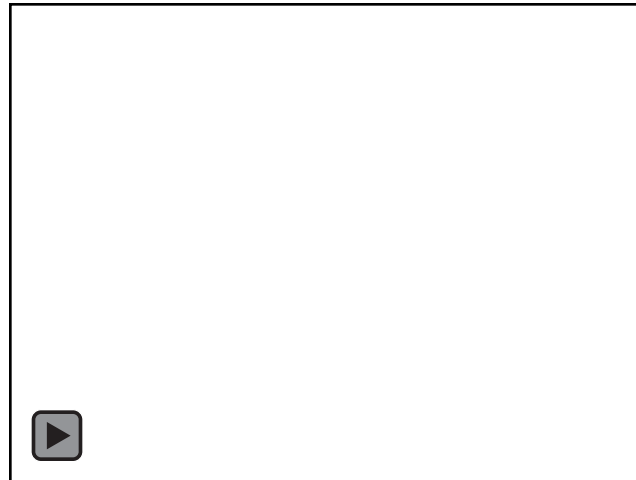
To conduct education, outreach, and communication on the value of crops and food produced from seed.



Our Goals

- To attract the best and brightest minds to agricultural fields of study.
- To teach students, communities, and consumers in the U.S. and abroad about the impact that seed-derived products have on their daily lives.
- To provide improved economic research to illustrate the value and importance of the seed industry to consumers and the agricultural community.
- To increase awareness among American consumers and students of the science that the seed industry is evolving, and that changing needs in agricultural education programs in plant breeding, genetics and seed science must be met if we are to keep pace with new global demands.
- To create new avenues to enable the seed industry to bring meaningful economic and philanthropic impacts to both the developed and developing world through improved agriculture production from improved seed.

FTSF Overview Video



You Say Tomato – I Say...

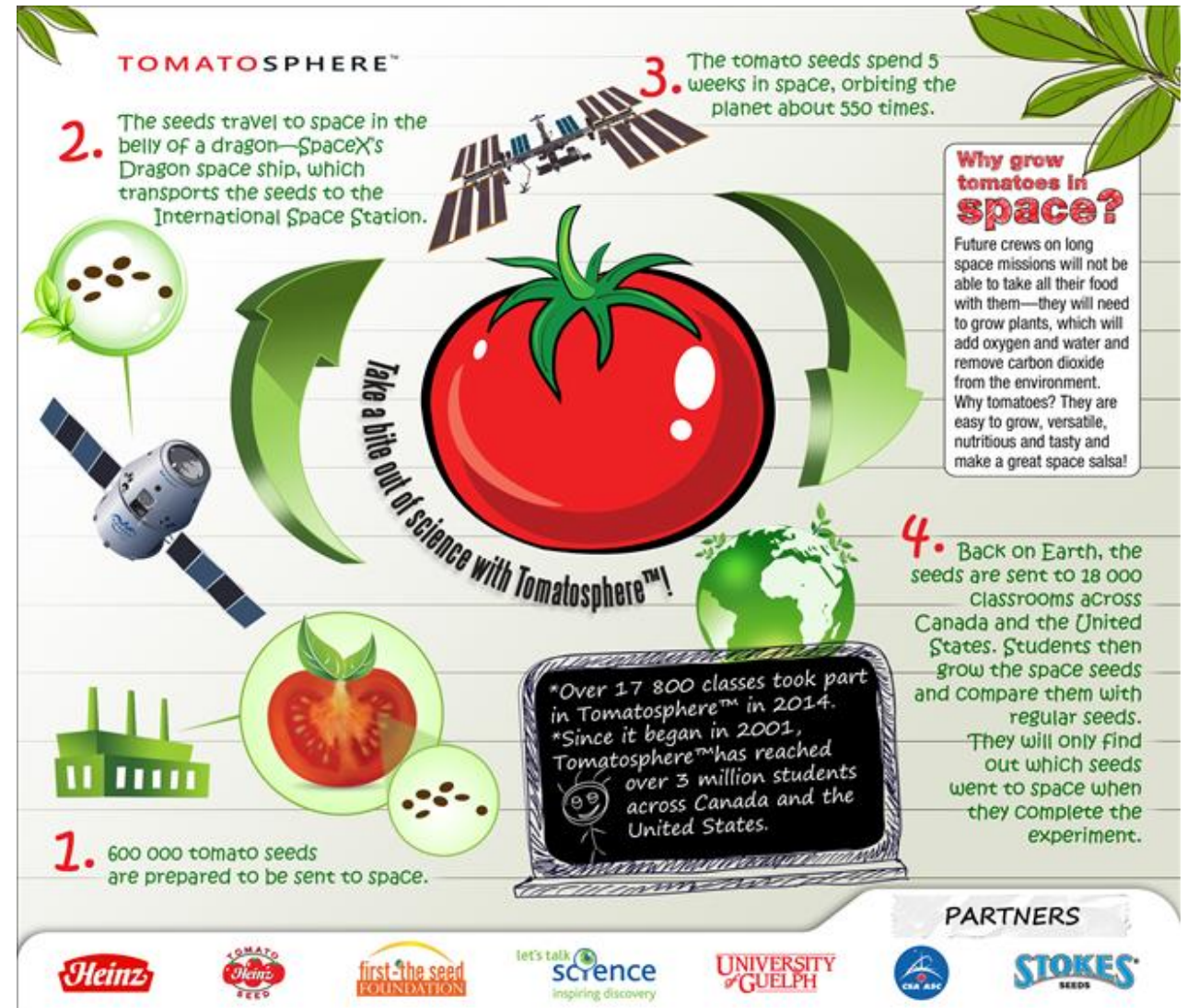


TOMATOSPHERE™

TOMATOSPHERE

Tomatosphere™ involves a unique combination of space-related science with plant agriculture. The project provides teachers and students with a blind study involving two sets of seeds:

- An Earth-based control group and
- A treated (or “tortured”) group that has been in space or has been subjected to simulated space conditions.



When teachers and students have germinated the seeds, results are submitted and recorded. Teachers are then informed of the “source” of each of the two sets of seeds.

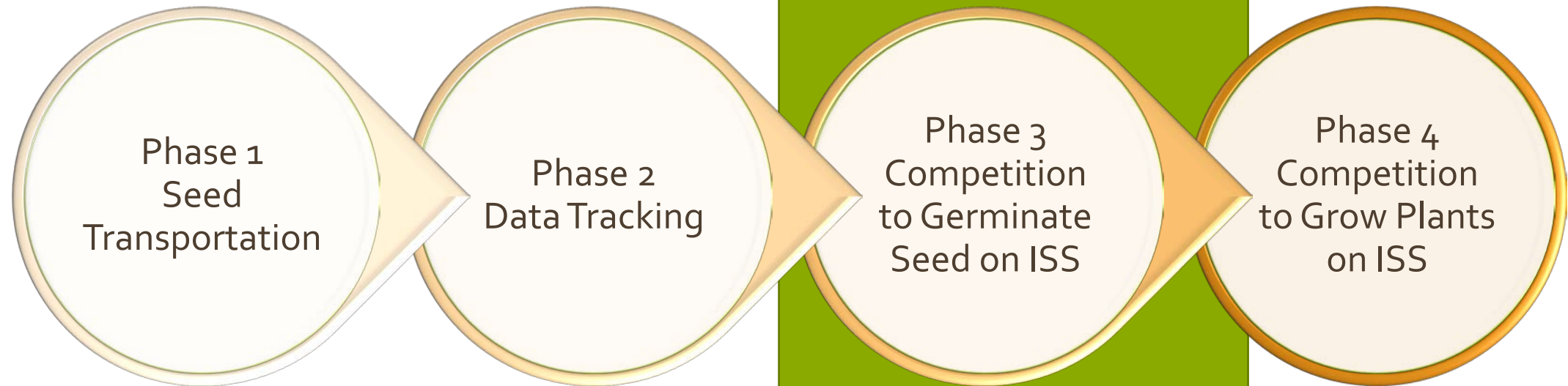
Germination rates from all participants are available for comparison.

Following submission of their results, teachers receive a master certificate for reproduction for students, recognizing their contribution to “real space science.”

Teachers are provided with instructions for taking the seedlings to full plant growth and are encouraged to harvest the tomatoes, use them to make salsa and other foods, or to donate them to local food banks.

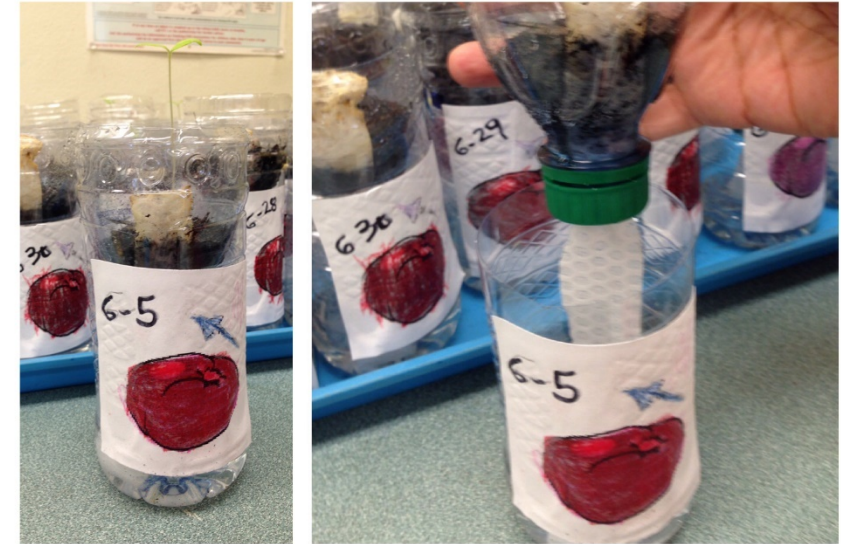


Four Phases



Phase One

- Seed transportation to the ISS and return (1,200,000 seeds).
- Seeds remain on-orbit a minimum of 10 days and no longer than 60 days (to support the seed delivery schedule and the intended science.)



Phase Two

- Data tracking/monitoring the seeds in in two parts:
 - One: Collecting data on the seeds from when they leave the Heinz supplier in Stockton, California through to arrival in Thorold, Ontario, via Buffalo, New York. This will give students a first-hand look at what seeds are subjected to “on the ground” (i.e. on Earth, as opposed to space transport).
 - Two: Collecting the same data as the seeds are sent to the ISS while the control seeds left on Earth are also monitored for comparison.
- Variables include temperature, humidity and pressure.



seedworld.com/tomatosphere-seeds-made-space/

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Tomatosphere Seeds Made it to Space

4 days ago - Compiled by Staff

The First-the-Seed Foundation announced that its Tomatosphere seeds made it to the International Space Station, along with nearly 6,000 pounds of supplies, June 3.

This launch is particularly exciting for the foundation, because this is the first batch of seeds to include HOBO data loggers, which allow for better observation of the exact conditions the seeds are exposed to while in space.

"We are now tracking the variables of temperature, humidity and pressure through all states of transportation," the



First In Innovation in
Seed Storage & Handling
meridianmfg.com



Phase Three

- Host a commercially funded STEM competition with the winning school leading an experiment to send a small sample (10-12 seeds) to the International Space Station and have them germinated on-orbit.
- Seed germination on board the ISS will be recorded using time-lapse photography, taken on an hourly basis for 10 days (240 images).
- Photos will be saved (when back on Earth) into a format that will be easily accessible by teachers and placed on the Tomatosphere website.
- Teachers and students can then compare their germination results, with those germinated on the International Space Station.



Phase Four

- Host a commercially funded STEM and research competitive program to grow a dwarf variety of tomato on the ISS in the VEGGIE growth chamber.
- The experiment will be used to expand the Tomatosphere curriculum materials to include:
 - Growing tomatoes to maturation on the ISS.
 - Allowing collaboration with professional scientists who will measure organism cellular level processes to analyze and understand the stresses placed on plant growth in space.



Tomatosphere-US supports and benefits the space program by...

- investigating which type of seeds would be most suitable for long duration spaceflight.
- inspiring students to pursue STEM fields and exposing them to real spaceflight research.

Thomas Pasquet on Tomatosphere

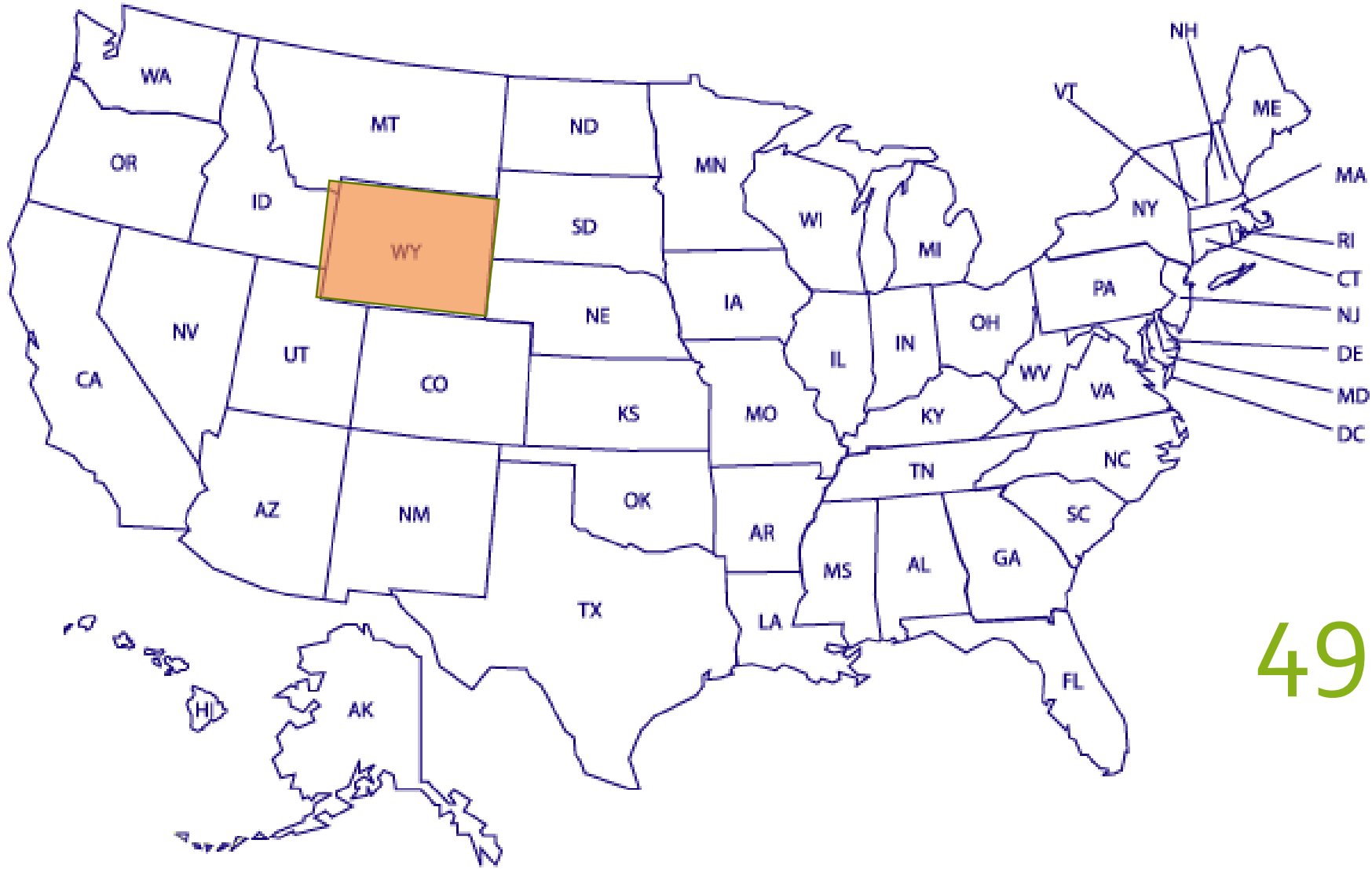


Loral O'Hara New NASA Astronaut

"...my 2nd grade class even got to grow tomato plants that had flown on the space shuttle - a program I actually just found out is going on today, with students flying seeds on the International Space Station."

<https://www.youtube.com/watch?v=LuXYPj6flj8&t=2712>

The Tomatosphere™ program has grown exponentially in recent years. In its 15- year existence, the program has reached approximately **3.3 million students.**



Currently in
49 out of 50 states.



Planting The Seed

- A standards-based curriculum that cultivates an understanding of seeds and their impact on society.
- Targeted for grades 6-8.



Planting The Seed

- Four teacher-approved lessons.
- Engaging hands-on activities.
- Ready to use in your science, ELA, social studies, or technology class.
- Aligned with national standards and 21st century skills.
- No extra preparation necessary.
- **FREE for educators!**



Planting The Seed

Cross-Curricular

- Lessons cover topics and address standards in a variety of core subject areas including Science, Technology, Social Studies, English Language Arts and Math.

Engaging Lessons

- Lessons are student-centered and inquiry-led. Learning activities deepen student understanding of the seed industry through real world connections, research projects, collaborative exercises and hands-on exploration. Lessons include teacher tips, key terms, extension activities and home-connections.

Planting The Seed

Standards-Based

- The curriculum is aligned to national education standards (Next Generation Science, Common Core ELA and Math, and National Council for Social Studies.) A standards chart is located on page 29. In addition, critical 21st century skills, such as creativity and innovation, are integrated throughout the curriculum.

Pacing Recommendations

- Each of the four lessons can be taught in one 45-minute class period. Extra class periods may be added to include the extension activities and other lesson modifications. Lessons are designed to build upon one another and are recommended to be delivered in sequence, but can also be taught individually.

LESSON

1

Seeds,
Up Close and
Personal!

LESSON OVERVIEW

The impact of seeds on our lives is enormous. Seeds are the foundation of human and animal life on earth. The foods we eat, the fibers in the clothes we wear, and most of the products we use in our daily lives are created from seeds – from corn, cotton, and canola to wheat, barley, and soybean, to vegetables, flax, and flowers. In this introductory lesson, students will explore and experiment with seeds and begin to recognize the impact seeds (and seed-derived products) have on their own lives.

TIME REQUIRED

One 45-minute class period
(Note: Extra class periods
can be added to include
extension activities.)

TOPICS

- Seeds
- Plants
- Agriculture

SUBJECT CONNECTIONS

- English Language Arts
- Science
- Technology
- Engineering
- Economics

SUPPLIES & PREPARATION

- Three different products made from seeds (for example, a cotton t-shirt, a piece of fruit or vegetable, and a container of canola oil)
- Classroom set of magnifying glasses and microscopes
- 10-15 Index cards for each student
- Hole punch
- String or one metal ring for each student
- 3 to 5 different varieties of seeds (bean, sunflower, lettuce, and basil seeds are inexpensive and germinate quickly)
- Colored pencils
- Two cups of soil for each student
- One clear plastic cup for each student
- Permanent marker
- Access to computers and printer
- Make three copies of the Seeds, Up Close and Personal! handout for each student

LEARNING OBJECTIVES

Students will...

- Identify a variety of seeds and what they are used for
- Understand how they interact with seed-derived products in their daily lives

ESSENTIAL QUESTIONS

- What is a seed?
- How do we depend on seeds/plants?
- What are seeds used for?
- How do I interact with seeds in my daily life?

STUDENT HANDOUTS

- Seeds, Up Close and Personal!



VIDEO

- Seeds: Up Close and Personal
www.firsttheseedfoundation.org/curriculum

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Planting the Seed

www.firsttheseedfoundation.org/curriculum

LESSON

4

Cultivating
What's Next

LESSON OVERVIEW

After learning about and engaging in seed science and technology in Lessons 1-3, Lesson 4 gives students the opportunity to explore what a career in the seed industry might look like. In conjunction with the Grow: A Seed Career Program handbook, this lesson guides students through researching different seed industry careers, understanding personal career values, and creating a checklist for personal college and career preparation.

TIME REQUIRED

One 45-minute class period
(Note: Extra class periods
can be added to include
extension activities and other
lesson modifications.)

TOPICS

- Career Opportunities
- Seed Industry
- College Readiness

SUBJECT CONNECTIONS

- English Language Arts
- Economics
- Technology
- Engineering
- Science
- Math

SUPPLIES & PREPARATION

- Download or order copies of the Grow: A Seed Career Program handbook (<http://www.firsttheseedfoundation.org/growseed.asp>)
- Secure access to laptops or computers and the internet
- Make copies of handouts for each student

LEARNING OBJECTIVES

Students will...

- Identify career opportunities in the seed industry
- Understand why the seed industry is an exciting field to be a part of
- Find and utilize resources to help them prepare for college and a career in the seed industry

ESSENTIAL QUESTIONS

- What kinds of career options are there in the seed industry?
- What career options may be suitable for my interests?
- What skills are needed for the career options I am interested in?

STUDENT HANDOUTS

- Seed Survey
- Seeds of Preparation*
- My Seeds of Preparation Checklist
- Seeds of Satisfaction Career Profiles 1-3*

*These handouts are part of the Grow: A Seed Career Program handbook



VIDEO

- Cultivating What's Next
www.firsttheseedfoundation.org/curriculum

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Planting the Seed

www.firsttheseedfoundation.org/curriculum



Grow A Seed

- Targeted for students in grades 9-12.
- **FREE for educators!**



Grow A Seed

- A list of seed careers with the most opportunities.
- A handy checklist to guide students through the basic steps in preparing for a future seed career.
- A parent handout with information and resources for learning about the wonderful career opportunities in the seed industry.
- A valuable, time-saving resource list of websites for students to check out seed-related careers, colleges, scholarships, internships, and much more.
- Career profiles of real people that provide a better idea of various job responsibilities, as well as the interests, skills, education, and training that led them to a successful career in the seed industry.

Seed Career List

Management and Business

- Market Research and Planning
- Advertising
- Product Management
- Marketing Administration
- Customer Service Manager
- Financial Manager
- Food Broker
- Human Resources Manager
- Sales Representative
- Business Manager

Interests and Skills:

sales, marketing, communication, organization, collaboration, creativity

Agriculture and Forestry Production

- Fruit and Vegetable Grower
- Greenhouse Manager
- Seed Producer
- Aquaculturist
- Field Production Agronomist
- Plant Operator
- Maintenance Technician
- Tree Farmer
- Viticulturist

Interests and Skills:

science, technology, computers, nature, problem-solving

Scientific and Engineering

- Plant Breeder
- Research Scientist
- Molecular Geneticist
- Field or Lab Technician
- Entomologist
- Pathologist
- Bioprocess Engineer
- Food Engineer
- Nanotechnologist
- Environmental Scientist
- Field, Plant, and Quality Manager
- Biomaterials Engineer
- Physiologist

Interests and Skills:

science, mathematics, genetics, computers, technology, research

Education, Communication and Governmental Services

- Agricultural Science and Business Teacher
- Agricultural Science Reporter
- Environmental Impact Analyst
- Food Inspector
- Public Relations Specialist
- Naturalist
- Conservation Officer
- Plant and Animal Inspector

Interests and Skills:

science, mathematics, education, communication, research, nature

“The nice part about agriculture is that there are literally opportunities everywhere.”

Jerry F.,
Director, Regulatory Affairs



STEP 1 Get to Know Yourself Better

The first step in discovering a career in the seed industry is taking some time to discover YOU.

- Meet with your school counselor or college advisor.** Ask for help in exploring career paths in the seed industry.
- Think about what you're good at.** When researching seed careers, you'll want to consider those that match your talents and interests.
- Consider your personal values.** What's important to you? Saving the environment? Helping to feed people in developing countries? You'll be happier going to work if you know you're contributing in a way that matters to you!
- Take personal interest inventories.** Inventories are questionnaires you fill out to discover career paths that are right for you. With all the career opportunities the seed industry has to offer, you'll need help zeroing in on the best careers for you. Ask your counselor or advisor to give you a personal interest inventory.
- Sign up for career exploration classes.** These classes give you an opportunity to research careers before making any decisions. They also help you prepare for life as a professional by focusing on the development of critical skills such as how to interview and write a resumé.
- Seek opportunities to volunteer and/or intern.** Volunteering or interning gives you a chance to discover your natural talents, explore your interests and develop important skills. It also shows prospective colleges and employers that you can handle commitment. Many seed companies offer such opportunities. Visit www.agfuture.org to learn more.
- Find a mentor.** A mentor can be a parent, teacher, counselor or industry professional. An effective mentor will guide you in preparing for your future and encourage you to take the steps you need to pursue your career path.

STEP 2 Research potential seed careers and companies

Once you've found a few seed industry careers that interest you, find out what they're all about.

- Ask your counselor for a list of seed-related websites.** There are seed professionals working in research, marketing, business and management, seed production and even education. As you learn more about each career, consider whether it matches your talents, interests and values. See page 11 for a list of seed-related websites.
- Research educational paths for those careers.** Find colleges that offer education programs for those careers. What courses would you need to take? How much is tuition? Do they offer scholarships? You can take virtual tours of many colleges at www.youniversitytv.com.
- Research companies that offer those careers.** Where are they located? How big are they? How successful have they been? Do they offer internship programs? Learn more about seed companies at www.seedquest.com.
- Find professionals working in those careers.** Ask to interview and/or "shadow" professionals working in the seed industry to get a better idea of what they do. As you see what a typical workday is like, try to envision yourself in that career.

Suggestions:



Ambassador Program

Ambassador Program

- Part of our commitment to fostering education, outreach, and communication on the value of crops and food produced from seeds.
- Our multi-year education program makes it possible for students to meet people working in the seed industry so they can ask questions and get a first-hand account of the many opportunities the seed industry has to offer.
- **FREE for educators!**





grow

Welcome to the Seed Ambassadors Program

Dear Seed Ambassador,

Thank you for your willingness to promote your industry to the workers of tomorrow!

You know better than anyone that the seed industry offers opportunity, stability, and career growth. Combining the needs of an expanding global community with the uncertain future of many industries, a seed career is an ideal solution for many who are just entering the job market. What's more, with your industry expanding rapidly, recruiting future workers is critical.

Whether a young person's goal is to be part of a high-tech, innovative industry ... earn a handsome living ... and/or make a difference in the world, your industry offers an excellent solution. And as a seed industry "success story" – you are in the ideal position to spread the word about seed careers!

We appreciate your commitment to the future of our industry.

Good luck!

[First the Seed representative/signature]

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Key Messages: The Seed/Agriculture Industry...

... represents the foundation of human and animal life.

Seeds provide the foods we eat, the fibers we wear, the fuel we consume, and most of the products we use in our daily lives.



... is full of job opportunities.

The agricultural industry generates nearly 22 million jobs in the United States – the majority of which are located off the farm. A 2004 USDA study estimated that there would be 52,000 job openings for new graduates through 2010, but only 49,300 qualified graduates available each year for these positions.



... is high-tech.

It is a science-based "business of the future" with inspiring challenges. During the past 30 years, the use of new technologies has led to a 50% increase in productivity of the major agricultural products. As the delivery mechanism for new plant technologies and varieties of plants, seed is the crux of agriculture. Quality seed is key to growing quality crops.



... has a history of innovation and change.

The industry is a key player in addressing the challenges of the world's increasing needs. Between 2015 and 2030, the world population is expected to grow by over 1.86 billion people – all of whom will need food, fiber, and fuel.

Today's students face the pressures of academic/standardized testing, college admissions, financial uncertainty, and entrance into the job market. Their counselors welcome and appreciate any opportunity to engage them in a positive way.

Working with College Career Offices

Some of your liveliest "prospects" for future seed careers may, in fact, be college students. These current students could be studying anything from science to business administration to marketing – and may be particularly receptive to learning about a career field that is ripe with opportunity.

- Contact the Career Development Office at your local college/university. Virtually every college, trade school, and university has one; you can find it on the institution's website.
 - At larger schools, there may be a counselor who specializes in certain career fields.
 - The career office may put you in touch with engaged faculty advisors in target departments.
- Offer to make your Seed Ambassador presentation. This could entail meeting with a small group of students at the career office; presenting at an on-campus career fair; or visiting a particular class/lab, such as for a biology or marketing course.
- Serve as a local mentor/advisor. Career counselors love having local experts available to answer student questions and guide them in industry-specific exploration.
- Consider a Career Corner blog or newsletter that would provide insight to local students who are embarking on their career searches. You could also offer to be profiled as an industry expert on the college's career service web pages; career offices are continually looking for new material and opportunities to feature.



Your Presentation Tools

Seed Ambassador PowerPoint® Presentation

This complete presentation is customizable and includes presentation notes for each slide.



The Seed Industry = Job Opportunity! Wall Poster

This printable leave-behind poster is a call to action for students, inspiring them to consider the seed industry.



The Seed Industry → Job Opportunity Student/Family Take-home

A handy folding flyer that highlights opportunities available in the seed industry and gives idea-starters for taking action.



First the Seed Career Website

Everything you need to know about career opportunities in the seed industry, including a wealth of opportunities that you can share with students, can be found at www.firsttheseed.org/! Be sure to download and print the Career Handbook. It's an excellent backgrounder for preparing for your presentation, and can be shared with students when you visit local schools. www.firsttheseedfoundation.org/docs/FTS-Handbook.pdf



Beyond the Classroom



Beyond the Classroom

- Harvest lunches
- Food bank and/or community donations
- Farmers' Markets
- Cooking/Recipes
- Composting

<http://www.wvalways.com/clip/12086569/north-elementary-visits-morgantown-farmers-market>

Beyond the Classroom

- Fun contests
 - ISS-Above
- News recognition
- FTSF/ASTA spotlights



The screenshot shows a news article from the North County Outlook. The header includes the logo for North County Outlook with the tagline 'Real People. Real Life.' and a banner for Quil Ceda Village with the text 'For more in QuilCedaVillage.co'. Below the header, there are navigation links for Home, News, Communities, Schools, Sports, Arts & Leisure, Business, Opinion, Obituaries, and Publications. The article title is 'Students study seeds that have been to space' and the sub-headline is 'Haller science students participate in tomato seed project that may help astronauts grow food in space'. The article is dated May 10, 2017, and is Volume 10, Number 27. The main text describes a project where sixth-grade science students at Haller Middle School studied tomato seeds that had been to space. A photo shows the students and a teacher standing behind trays of growing tomato plants. A quote from student Kiah Hoekema is included at the bottom of the article.

North County Outlook
Real People. Real Life.

Quil Ceda Village
For more in QuilCedaVillage.co

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Students study seeds that have been to space

Haller science students participate in tomato seed project that may help astronauts grow food in space

Like Share Tweet G+ Share +

May 10, 2017 | Vol. 10 No. 27 | View PDF



Courtesy of Arlington Public Schools

Over the past month, sixth-grade science students at Haller Middle School have been studying tomato seeds that have gone to space to see how they grow in Earth's atmosphere.

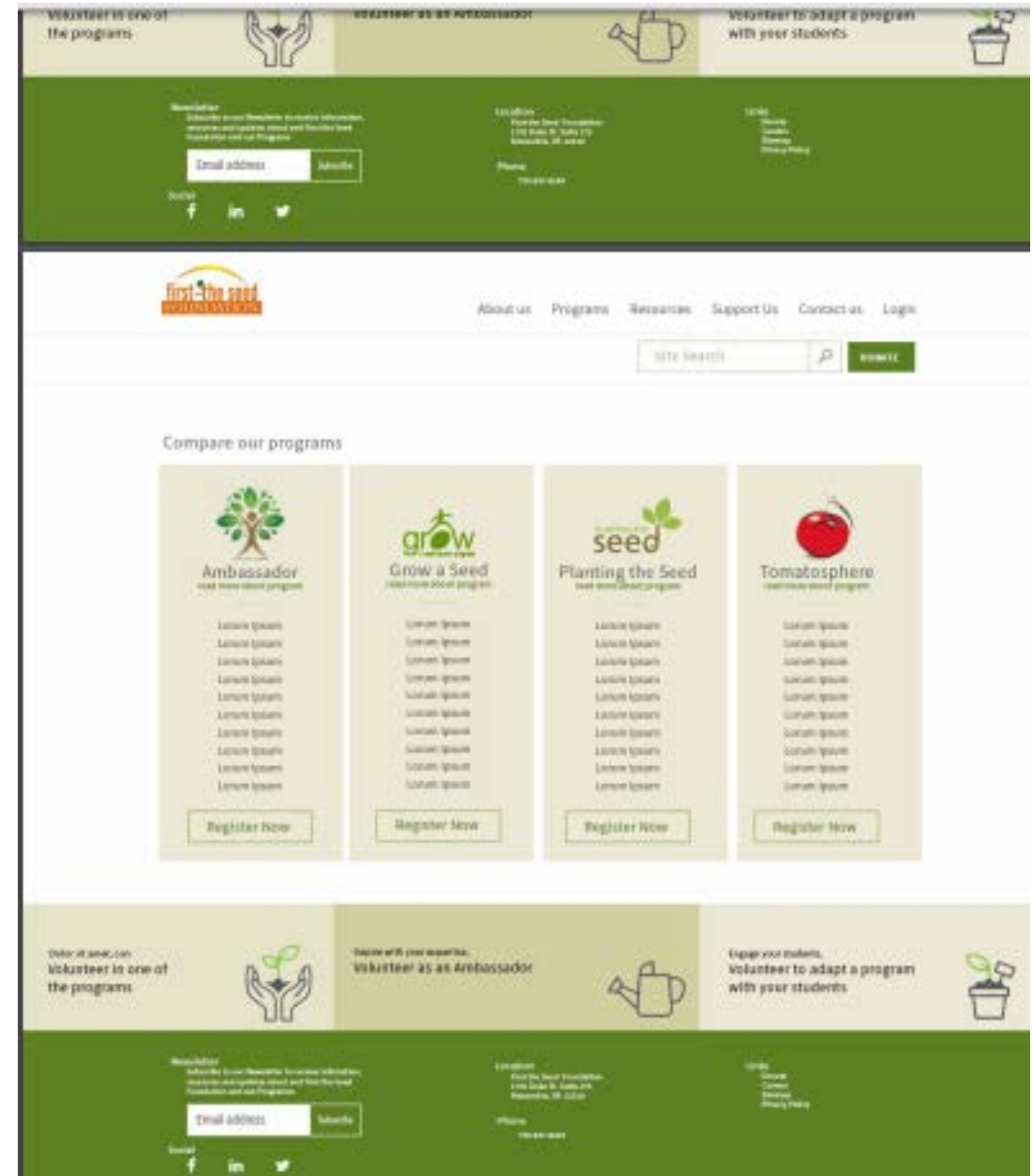
They're seeds that have gone where no seed has gone before. Over the past month, sixth-grade science students at Haller Middle School have been studying tomato seeds that have gone to space to see how they grow in Earth's atmosphere.

The students studied two sets of tomato seeds - one set that went to space and one that didn't. The students didn't know which set was which and had to predict which one would grow better. The students discovered that the space seeds grew significantly faster than the Earth-bound seeds.

"I was very surprised to see how much faster the space seeds grew," said sixth-grader Kiah Hoekema. "It was really cool to grow something that had come from space."

Our Website

- Register to participate
 - Submit results
 - Download many free resources
 - Link to helpful websites
 - Compare our programs
- Also on Social:
 - Facebook:
<https://www.facebook.com/FirsttheSeed/>
 - Twitter: @1stTheSeed



Space Station Explorers

- Consortium managed by the Center for the Advancement of Science in Space (CASIS).
- Several space-related programs.
 - Ants in Space
 - Story Time From Space
 - Zero Robotics
 - Amateur Radio on the ISS

<http://www.spacestationexplorers.org/>





TOMATOSPHERE

Our dreams are out of this world.



FARMERS WANTED

Sabrina DeVall
Program Manager, FTSF

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