



Plant Systems Substitute Teacher Guide

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This guide includes different options for curated and cohesive activities to leave for students when you need to be away from your classroom for a varying number of days.

****Each plan includes links to all resources, which are fully editable to suit the needs of your classroom and students.***

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 - Option 1: Exploring Plant Systems Through Horticulture
 - Option 2: Exploring Plant Systems Through Production Agriculture

One-Day Plans

Linked below are several National FFA Educator Resources to select from that would work well to leave for your students when you will be away from your classroom for a single day. Click on each link to access the materials for that activity.

Resource	Time	Description
What's Up With Almond Girl Jenny? FFA New Horizons Activity	50 minutes	Read an FFA New Horizons article about how a farmer named Jenny has found success growing almonds. Then, complete an activity about the growth cycle of and uses for almonds.
Plants Are Amazing FFA New Horizons Activity	90 minutes	Read an FFA New Horizons article about how an FFA chapter uses vertical farming to grow plants in the city. Then, complete an activity about how you can plan your own vertical farm.
Lindsay, Eric and Kailey Lipka – SAE – School Garden and Food Dishes	50 minutes	Watch a video about three students' school garden SAE. Then, complete an activity to plan for your own garden.
Tractor Supply Company: How and Why to Compost	30 minutes	Watch a video about composting. Then, complete the activity about composting and why it is important.
Current Event Activity	50 minutes	Choose a current event in the Plant Systems industry. Then, complete the current event worksheet based on that event.
SpeakAg Dialogues: Will Plant Evolution Surpass Herbicides and Pesticides on the Market?	50 minutes	Watch the #SpeakAg Dialogue and complete the activity advocating for or against the issue.
FFA in the USA Article Activity	50 minutes	Find an FFA in the USA article about Plant Systems to read and complete Parts 1 and 2 of the worksheet about the article you read.
Mitch Hopkins – Fiber & Oil Crop Production SAE	60 minutes	Watch a video to learn about Mitch Hopkins's fiber and oil crop production SAE. Then, research a variety of topics focused on cotton.
High-Tech Gardening FFA New Horizons Activity	60 minutes	Read an FFA New Horizons article about high-tech gardening. Then, complete an activity to learn about and create your own robot.
The FFA Roots of a Garden Party FFA New Horizons Activity	50 minutes	Read an FFA New Horizons article about how two sisters started their horticulture business during their time in high school. Then, complete an activity about floral shops and planning your own.
Fruit Production SAE – William Martin	60 minutes	Watch a video about a fruit production SAE. Then, complete an activity to plan for your own orchard.
Vocabulary Activities (Word PDF)	50 minutes	Choose from a bank of eight vocabulary activities and complete a vocabulary activity using this list of Plant Systems-related vocabulary terms .

Additionally, you can find some of these activities on a choice board linked below. This choice board is designed in a way that none of the activities require the completion of the other activities so you can provide options for your students when you need to be away from your classroom for a day.

Plant Systems Substitute Choice Board:

Word Document: <https://ffa.box.com/s/cycstaadilf2ykcxng79xwqklyhnp6ku>

PDF: <https://ffa.box.com/s/inok5hc02sf2lj8xpytfszue3znegjr0>

Google Doc: <https://docs.google.com/document/d/1UiZ-6B6A9ThHc0xtytxSbCLKhWACzUILhISdH7SXXKo/copy>

****Choice Board Note:** All student activity sheets from the choice board will need to be printed and available in your classroom or posted on your school's learning management system for students to access to complete the activities.

Three-Day Plans

Below are two options for cohesive plans that would work to leave for your students when you will be away from your classroom for three consecutive days. Each plan contains activities that connect well to each other as well as a sheet with daily introductory and closure activities/questions (bell work and exit tickets) to further connect the activities and concepts to each other. Each plan also includes the student learning objectives, a list of materials to print or post to your school's learning management system and ideas for extension activities.

Option 1: Careers in Plant Systems

Click [here](#) to access the written plan that you may leave for your substitute. (Click [here](#) for the Google Docs version.)

Student Learning Objectives	Materials
After completing these activities, students will ... 1. Identify careers of interest in the Plant Systems pathway. 2. Explore the value chain and determine how Plant Systems impacts it. 3. Plan for future careers in the Plant Systems pathway.	Student Activity Sheets to Print or Post: • Three-Day Substitute Daily Activity Sheet: Option 1 (Word PDF Google Doc) • Introduction to Careers With Plants student activity sheet Other Materials Needed: • Student devices with internet access • Poster supplies: markers, paper, etc. • Plant Systems Career Bingo Card • Plant Science Career Cards, one per student
Vocabulary Terms	
1. Plant Systems 2. Value Chain	
Day-to-Day Plans	
Day 1: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) Direct students to the Plant Systems category on AgExplorer: AgExplorer.FFA.org/focus/plant-systems/. Once there, looking at the Plant Systems careers on AgExplorer, what is one career in the Plant Systems focus area that you are interested in learning more about and why? 2. Activity: Tell the class: <i>Over the next three days, we'll be exploring careers in plant science.</i> a. Hand out the Introduction to Careers With Plants student activity sheet. b. Put students into groups of two or three students and assign them one of the AFNR Value Chain stages found at the top of the student activity sheet. c. In their groups, they will complete Part 1 of the student activity sheet. d. They should be ready to present their poster to the class tomorrow. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.) What part(s) of the poster project did you help with? How did your team work together to complete the assignment?	
Day 2: (50 minutes) 1. Bell Ringer: (Students will record the following on their Daily Activity Sheets.) What was your assigned stage of the value chain? What are three careers that are connected to that stage? 2. Activity: a. Students will present their posters from yesterday with their groups. b. As each group presents, have students complete Part 2 of their student activity sheets from yesterday. c. When all the posters are presented, direct students to complete Part 3 of their student activity sheets. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.)	

What careers in Plant Systems did you learn about today that you did not already know about?

Day 3: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
What Plant Systems careers, from the presentations from yesterday, are you interested in learning more about?
2. **Activity:**
 - a. Hand out the [Plant Systems Career Bingo Card](#) and one [Plant Science Career Card](#) to each student.
 - b. Students will play bingo.
Round Setup:
 - Students will start by sitting across from each other. Each round will be two or three minutes long, and during that time, one student will describe their career to their partner using the description on their card.
 - After two or three minutes, a timer will signal that it's time to switch. Students will rotate to a new partner and share their career with the next person.**How It Works:**
 - Student A will introduce the career on their card. For example, "I'm a farmer, and I grow crops and raise animals for food and other products. My work involves managing land and sometimes working with machines or animals."
 - After Student A finishes their description, Student B will share their career. They'll read the career description from their card and explain it in a similar fashion.
 - After two or three minutes, a bell rings or the timer goes off, and students rotate to a new partner.
 - Repeat the process: Continue rotating and sharing new careers with new partners until each student has met with several different careers.
 - Students will complete their bingo card as they do the activity. The first student to receive a bingo will win a prize.
 - c. When done, students will complete Part 5 of their student activity sheets. Each student will utilize their student activity sheet and [AgExplorer](#) to explore various plant science careers. Students will research at least two plant science careers they find interesting and create a career profile for each career.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
Which plant science career did you find most interesting this week? Why? What do you think the impact would be if this career did not exist?

Potential Extension Activities

- Have students learn more about different SAEs in Plant Systems by watching one or more of the [SAE videos](#) and completing this [video analysis activity](#) for each video they watch.
- Students can learn about the impact of SAEs directly from a person in the agriculture industry who had an SAE in high school by watching a video from the [SAEs Inspiring Careers video library](#) and completing the [SAEs Inspiring Careers Video Activity](#).

Option 2: Exploring Plant Systems Through Gardening

Click [here](#) to access the written plan that you may leave for your substitute. (Click [here](#) for the Google Docs version.)

Student Learning Objectives	Materials
After completing these activities, students will ... 1. Analyze the components of a successful school-based enterprise. 2. Develop a school-based enterprise proposal. 3. Evaluate how a school-based enterprise can meet local needs and create connections between classroom learning and community impact. 4. Plan for a school garden.	Student Activity Sheets to Print or Post: • Three-Day Substitute Daily Activity Sheet: Option 2 (Word PDF Google Doc) • Sydnee and Raelyn – School Garden student activity sheet • Wren, Jayden, Thomas, Vance, Alexys, Destiny, Hayden – School Garden and Hot Sauce SAE student activity sheet Other Materials Needed: • Student devices with internet access
Vocabulary Terms	
1. Business Plan 2. SAE 3. School-Based Enterprise	
Day-to-Day Plans	
Day 1: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) Have you ever had your own garden? If yes, did you enjoy working in it? If no, would you like to have your own garden? Why or why not? 2. Activity: Tell the class: <i>Over the next three days, we'll be exploring plant science through learning about gardening.</i> a. Hand out the Sydnee and Raelyn – School Garden student activity sheet. b. Students should watch the SAE video available at https://vimeo.com/379629138 and complete the student activity sheet. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.) What was the most difficult part of designing your garden plot?	
Day 2: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) If you could own your own business, what would it be and why? 2. Activity: Tell the class: <i>Yesterday, we learned about a school garden and planned for our own gardens. Today, we are going to look at another school garden and see how this school has taken their garden to the next level through their own school-based enterprise and hot sauce brand.</i> a. Hand out the Wren, Jayden, Thomas, Vance, Alexys, Destiny, Hayden – School Garden and Hot Sauce SAE student activity sheet. b. Students should watch the SAE video found here: https://vimeo.com/1108190745. c. Students should complete Parts 1-3 of their student activity sheets and be prepared to present tomorrow. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.) What school-based enterprise did you create your presentation on? Why did you choose that idea?	
Day 3: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) If you had \$500 to invest in one of your classmate's school-based enterprises, what would you look for before choosing which one to invest in? 2. Activity: Have students present their school-based enterprise presentations from yesterday. a. As their classmates present, students must write down and ask at least three questions total.	

- b. When all presentations are complete, students should answer the reflection questions on the bottom of their student activity sheets.

3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
What resources or tools would you need to launch your school-based enterprise at school?

Potential Extension Activities

- Have students give feedback to each other on their business plans and revise their plans based on that feedback.
- Have students explore grant opportunities at FFA.org/financial-assistance/ to fund their school-based enterprises.

Five-Day Plans:

Below are two options for cohesive plans that would work to leave for your students when you will be away from your classroom for five consecutive days. Each plan contains activities that connect well to each other as well as a sheet with daily introductory and closure activities/questions (bell work and exit tickets) to further connect the activities and concepts to each other. Each plan also includes the student learning objectives, a list of materials to print or post to your school's learning management system and ideas for extension activities.

Option 1: Exploring Plant Systems Through Horticulture

Click [here](#) to access the written plan that you may leave for your substitute. (Click [here](#) for the Google Docs version.)

Student Learning Objectives	Materials
After completing these activities, students will ... 1. Examine the components of a hydroponics system. 2. Describe the benefits of hydroponics. 3. Evaluate and compare space farming with conventional farming. 4. Identify the role agriculture plays in space farming.	Student Activity Sheets to Print or Post: • Five-Day Substitute Daily Activity Sheet: Option 1 (Word PDF Google Doc) • Generic FFA Blue 365 Video Activity for Students • Space Farmer Student Activity Sheet • Giovanni Roman – SAE Hydroponics Student Activity Sheet • Mary Kate Okula and Reyna Ramos, Hydroponic Lettuce School-Based SAE Student Activity Sheet Other Materials Needed: • Student devices with internet access • FFA New Horizons Space Farmer article
Vocabulary Terms	
1. Horticulture 2. Hydroponics 3. SAE 4. School-Based Enterprise 5. Space Farming	
Day-to-Day Plans	
Day 1: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) Why do you think learning how to grow plants in space is important? 2. Activity: Tell the class: <i>Over the next five days, we are going to learn about Plant Systems through horticulture in unique ways such as space farming and hydroponics. You'll have a chance to explore the different ways plants are grown and plan for your own unique way of growing plants.</i> a. Hand out the Generic FFA Blue 365 Video Activity for Students student activity sheet. b. Students should watch the Blue 365 Video available at https://ffa.box.com/s/8ktd52cwpa2cwhymyeyu3h3qkxrlagkb and complete the student activity sheet as they watch. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.) What role does agriculture play in the space program?	
Day 2: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) What role do you think agriculture plays in space travel? 2. Activity: Tell the class: <i>Yesterday, we learned about how NASA is growing plants in space. Today, we will look more locally at a former FFA member who is using what he learned in FFA to pursue a career at NASA.</i>	

- a. Hand out the [FFA New Horizons Space Farmer article](#) and the [Space Farmer](#) Student Activity Sheet.
- b. Students will complete both parts of the student activity sheet.

3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
How are new foods developed for the space program? Why is this important?

Day 3: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
What are the requirements to grow a plant?
2. **Activity:** Tell the class: *The past two days we learned about space farming. The next three days we will be diving into hydroponics and how that is filling a gap to help feed the world through alternative methods. You will also have a chance to plan for your own hydroponics system.*
 - a. Hand out the [Giovanni Roman – SAE Hydroponics](#) Student Activity Sheet.
 - b. Students will watch the SAE video found here: <https://vimeo.com/300298524>.
 - c. Students will complete the entire student activity sheet.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
If you were planning your own hydroponics system, what plants would you grow and why?

Day 4: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
How can hydroponics help feed the growing population?
2. **Activity:** Tell the class: *Today, you will have a chance to learn about a hydroponics system being run at a school in North Carolina. You will then have a chance to plan for your own school-based enterprise that can be done right here at our school.*
 - a. Hand out the [Mary Kate Okula and Reyna Ramos, Hydroponic Lettuce School-Based SAE](#) Student Activity Sheet.
 - b. Students will watch the SAE video found here: <https://vimeo.com/1108190707>.
 - c. They will complete Parts 1 and 2 of the student activity sheet: Hydroponics School-Based SAE.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
What resources do you have available at your school for starting a plant systems-based SAE?

Day 5: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
What are three challenges you see that may prevent students from starting an SAE?
2. **Activity:** Direct students to their [Mary Kate Okula and Reyna Ramos, Hydroponic Lettuce School-Based SAE](#) Student Activity Sheet from yesterday. They should complete Parts 1, 2 and 3 of that activity sheet titled "SAEs at School."
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
If you could choose a school-based enterprise to start at school, what would it be and why?

Potential Extension Activities

- Have students share the school-based enterprises they planned for, get feedback and apply that feedback to their plans.
- Have students explore grant opportunities at [FFA.org/financial-assistance/](https://www.ffa.org/financial-assistance/) to fund their school-based enterprises.
- Have students look into the National FFA Endorsed Activity: Plant the Moon Challenge found on this page: [Designated Events and Endorsed Activities | National FFA Organization](#).

Option 2: Exploring Plant Systems Through Production Agriculture

Click [here](#) to access the written plan that you may leave for your substitute. (Click [here](#) for the Google Docs version.)

Student Learning Objectives	Materials
After completing these activities, students will ... 1. Identify the impact of soybeans on our daily lives. 2. Classify varying perspectives on issues impacting the agriculture industry. 3. Identify automation in agriculture and determine how it affects the industry.	Student Activity Sheets to Print or Post: • Five-Day Substitute Daily Activity Sheet: Option 2 (Word PDF Google Doc) • Sensational Soy Student Activity Sheet • Advocacy #SpeakAg Dialogues Student Activity Sheet • #SpeakAg Dialogues Student Activity Sheet • Automation in Agriculture Student Activity Sheet Other Materials Needed: • Student devices with internet access • One small Ziploc bag per student • One tablespoon cornstarch per student • One tablespoon water per student • 1/8 teaspoon soybean oil per student • Two to three drops food coloring of choice per student • One-tablespoon measuring spoon • 1/8-teaspoon measuring spoon • Microwave • Eye droppers or pipettes • Blank paper, one per student • Markers • FFA New Horizons Automation in Agriculture Article
Vocabulary Terms	
1. Automation 2. Biodiesel 3. Biofuel 4. Crop Rotation 5. Harvest 6. Herbicide 7. Precision Agriculture 8. Soybean Meal	
Day-to-Day Plans	
Day 1: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) What crops are grown near you? What products are made from those crops? 2. Activity: Tell the class: <i>Over the next five days, we are going to learn about production agriculture and how it plays a vital role in our everyday lives.</i> a. Hand out the Sensational Soy student activity sheet. b. Students should complete Part 1 of the student activity sheet. 3. Exit Ticket: (Students will answer the following prompt on their Daily Activity Sheets.) What are three products in your life that come from soybeans?	
Day 2: (50 minutes) 1. Bell Ringer: (Students will answer the following prompt on their Daily Activity Sheets.) Think about what you ate over the last 24 hours. What aspects of production agriculture were utilized to make those food products?	

2. **Activity:** Tell the class: *Yesterday, we learned about soybeans and the role they play in our daily lives. Today, we will further explore the industry and apply what we learn through a video project.*
 - a. Direct students to their student activity sheets from the previous day. They will complete Parts 2 and 3 on that activity sheet.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
Summarize the importance of production agriculture in one sentence that a grandparent, sibling or community member unfamiliar with the industry would understand.

Day 3: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
If you had five acres of farmland, what would you focus on? Feed, food or fuel? Explain.
2. **Activity:** Tell the class: *The past two days we looked into the soybean industry and the role it plays in our daily lives. Today, we are going to zoom out and learn more about conventional and organic farming and the role they both play in production agriculture and feeding the world.*
 - a. Hand out the [Advocacy #SpeakAg Dialogues](#) Student Activity Sheet.
 - b. Have student watch the #SpeakAg Dialog video found here: <https://vimeo.com/260416554>.
 - c. Students will complete the student activity sheet as they watch the video.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
Has your answer from the bell ringer changed or stayed the same? Why?

Day 4: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
How do you think plants have evolved or changed over the last 100 years? Why?
2. **Activity:** Tell the class: *Yesterday, we looked at how we can use production agriculture to continue to feed the world. Today, we will discover how plants have evolved over time and how we can use that to our advantage.*
 - a. Have students partner up and give each group a piece of paper. Ask students to draw out a “Why it’s made?” comic strip. Each comic strip should take an object like a pencil or a ruler and show how it was thought up. The comic strip should have three or four frames and show where the idea started and then how they came up with the design. An example: “Why a pencil was made?” The first frame could be someone writing in pen and then messing up so they have to develop something erasable. They then go find the materials to make the pencil and then create something new.
 - b. Once completed, have two or three groups share their comic strips. Introduce the #SpeakAg Dialogue video that will talk about how scientists are still asking the question “How should we make it?” in order to slow the path of plant evolution. The video will show different methods of persuasion and examples of how to communicate with others who don’t understand our viewpoint. Pass out the accompanying worksheet or have paper for the students to take notes.
 - c. Hand out the [#SpeakAg Dialogues](#) Student Activity Sheet.
 - d. Students will watch the video found here: <https://vimeo.com/320526965>.
 - e. They will complete the student activity sheet while they watch.
3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
What are three things you learned about plant evolution from the video?

Day 5: (50 minutes)

1. **Bell Ringer:** (Students will answer the following prompt on their Daily Activity Sheets.)
Using the box on the first page of your student activity sheet, draw a picture of what automation looks like to you.
2. **Activity:** Tell students: *Yesterday, we learned about how plants have evolved to meet our needs over time. Today, we will look at how technology has changed and evolved over time to meet the needs of the agriculture industry.*
 - a. Hand out the [Automation in Agriculture](#) Student Activity Sheet.

- b. Students will read the *FFA New Horizons* [Automation in Agriculture](#) article and complete Parts 1, 2 and 3 of their student activity sheets.

3. **Exit Ticket:** (Students will answer the following prompt on their Daily Activity Sheets.)
How does automation in agriculture impact the future of the industry?

Potential Extension Activities

- Have students complete Activities 2, 3 and 4 of the “[Bunge: Soy Along the Value Chain](#)” lesson series.
- Have students watch additional [#SpeakAg Dialogues videos](#).