

Three Sisters Companion Planting

SUBJECT AREA: SCIENCE

GRADE: 4



GENERAL LEARNER OUTCOMES

Topic E: Plant Growth & Changes

Students will:

4-10 Demonstrate knowledge and skills for the study, interpretation, propagation and enhancement of plant growth.



SPECIFIC LEARNER OUTCOMES

Students will:

- Describe the importance of plants to humans and their importance to the natural environment.
- Recognize that plant requirements for growth; i.e., air, light energy, water, nutrients and space; vary from plant to plant and that other conditions; e.g., temperature and humidity; may also be important to the growth of particular plants.
- Identify examples of plants that have special needs.
- Recognize that plants of the same kind have a common life cycle and produce new plants that are similar, but not identical, to the parent plants.
- Nurture a plant through one complete life cycle-from seed to seed.
- Describe the care and growth of a plant that students have nurtured, in particular:
 - Identify the light, temperature and water requirements of the plant.
 - Identify the growing medium requirements of the plant.
 - Identify the life stages of the plant.
 - Identify the reproductive structures of the plant.





STUDENT LEARNING OBJECTIVES

Students will:

- Describe the importance of plants to humans and their importance to the natural environment.
- Recognize that plant requirements for growth vary from plant to plant and that other conditions may also be important to the growth of particular plants.
- Identify examples of plants that have special needs.
- Recognize that plants of the same kind have a common life cycle and produce new plants that are similar, but not identical, to the parent plants.
- Nurture a plant through one complete life cycle-from seed to seed.
- Describe the care and growth of a plant that students have nurtured.



ASSESSMENT

Students will provide evidence of learning by:

- Nurturing the “Three Sisters” through one complete life cycle-from seed to seed.
- Keeping a diary of the growth and care of the “Three Sisters” and reflect on other learning objectives in Science 4 - Topic E



MATERIALS

[The Three Sisters Legend \(3:06 min\)](#)

[Three Sisters Garden \(3:27 min\)](#)

[Seed Germination \(5:27 min\)](#)

[What a Plant Needs to Stay Alive \(2:05 min\)](#)

[Starting the Three Sisters Planting Method \(2:45 min\)](#)

[How to Use the Three Sisters Planting Method \(1:40 min\)](#)

[Three Sisters Corn Soup \(6:12 min\)](#)



LEARNING RESOURCES

Alberta Education Programs of Studies



In learning about plant growth and change, it is always fun for students to enjoy discovery learning and immerse themselves in a hands-on project. With this concept in mind, students will have the experience of nurturing plants through one complete life-cycle; from seed to seed, of a “Three Sisters” garden. This companion planting method is one that members of the Iroquois confederacy has used for centuries. If you have the opportunity it is fun to work in a community garden space at your school, otherwise students will need to prepare and complete the growing portion of the project in their home gardens.

Students will keep a diary of the progression of the plants that will also reinforce other learning objectives in Science 4 - Topic E. Many of these suggested learning experiences have been derived from the Cornell University’s College of Agriculture and Life Sciences.

History of Three Sisters Companion Planting

As discussed in Wikipedia, the Three Sisters “are the three main agricultural crops of various indigenous groups in North America: winter squash, maize (corn), and climbing beans (typically tepary beans or common beans).” You will want to share some of the background information from Wikipedia with your students:

Wikipedia: Three Sisters Agriculture

View:

Storytelling background of the plant combination for students.

Three Sisters Garden (3:27 min)

The Iroquois legend of the three sisters' garden.

The Three Sisters Legend (3:06 min)

In the student assignment, criteria is listed by page for the students to complete. Videos are listed here to help students answer questions presented in the DIARY.



Page 1 - Title Page

Page 2 - Life Cycle of a Plant:

View:

[Seed Germination](https://youtu.be/TE6xptjgNRO) (5:27 min) <https://youtu.be/TE6xptjgNRO>

Read:

[The Plant Life Cycle for Kids](#)

Page 3 - Special Needs

View:

[What a Plant Needs to Stay Alive](#) (2:05 min)

KEY Discuss the special needs of the “Three Sisters” plants?

- Light energy: gives energy and warmth for the plant to survive
- Water / moisture: helps move nutrients to the stems and leaves
- Nutrients: help the plant grow healthy and strong
- Air; helps the plant make its own food (photosynthesis)
- Space to grow

Page 4 - Three Sisters Companion Planting

[Read and discuss: How to plant the Three Sisters](#) (by Cornell University)

View:

[Starting the Three Sisters Planting Method](#) (2:45 min ... a suggested simplified method)

How did you prepare the growing space for the Three Sisters?

View:

[How to Use the Three Sisters Planting Method](#) (1:40 min)

KEY How do the plants benefit and compliment each other when grown together?

- Corn provides a trellis system for the bean plants as they grow
- Beans provide nitrogen to feed the corn
- Squash (pumpkins) sends shoots with huge leaves across the ground, which protects the soil from drying out, helps the soil retain moisture, keeps the weeds down, and deters pests with its prickly surfaces

Page 5 - Plant Diversity

- Are all the leaves of your individual plant species exactly alike? Students will recognize that plants of the same kind have a common life cycle and produce new plants that are similar, but not identical, to the parent plants through observation and the use of rubbings.

Page 6 - Nutrients

KEY What nutrients can you get from each of the Three Sisters? Importance of each plant as a source of food?

Numerous charts are available to use for the nutrient content of the Three Sisters. An example is :

Vegetable Nutrition Fact Chart (U.S. Food and Drug Administration 2008)

- Using the above chart students can determine noticeable nutritional components.
- The Three Sisters Corn Soup on (Diary page 8 - Recipe) also discusses the nutritional value.

Page 7 - Growth Chart and Observations

Describe how you recorded the growth of each of the Three Sisters.

A suggested organizational chart is included in the student assignment.

Page 8 - Recipe

What recipe would you like to try with your harvest of corn, beans and/or squash?

View:

Three Sisters Corn Soup (6:12 min)

This is an example of how the Ukwakhwa make a soup that uses all of the Three Sisters vegetables, and explains its nutritional value.

CORNBREAD MUFFINS

Makes: 12 muffins

Ingredients:

¾ cup cornmeal
1 ¼ cup whole wheat flour
¼ cup white sugar
2 teaspoons baking powder
Pinch of salt
1 egg, beaten
2 tablespoons honey
¼ cup canola oil
1 cup milk

Method:

1. Preheat the oven to 400 degrees F. Grease muffin pan or line with paper muffin liners.
2. In a large bowl, mix together cornmeal, flour, sugar, baking powder and salt.
3. In another bowl, add the egg, honey, oil and milk; stir to combine. Mix into the bowl with the dry mixture. Whisk until just blended. Spoon batter into prepared muffin cups.
4. Bake at 400 degrees F for 15 to 20 minutes, or the tops are golden brown.
5. Remove from the oven, cool for a few minutes, and serve warm!



Page 9 - Gratitude Card (optional)

Write about your harvest in a Gratitude card for Thanksgiving? Who will receive your card?

Page 10

- Bibliography - did you use any pictures or collect information? Copy and paste the URLs here

Before presenting the assignment to the students:

- Review how to copy and paste the URL for any pictures or information that was collected from the internet onto a BIBLIOGRAPHY Slide, Doc or a written Diary page.

In this assignment, you will experience the exciting opportunity of nurturing a “Three Sisters” Garden of corn, beans, and squash through one complete life cycle ... from seed to seed. Combining these three main agricultural crops was used by various indigenous groups in North America. This type of companion planting is based on the idea that all living things rely on each other for survival. By creating the Three Sisters community of plants, an ecosystem is formed where corn, beans and squash help each other grow.

You will complete a Diary to track your learning experiences and record information about the growth of your 3 different plants. This project can be completed individually or in a group. Your DIARY pages can be completed on Google Slides, Docs or can be handwritten. Each page is listed with things for you to complete.

DIARY ENTRIES

Page 1 -Title Page

- Include a TITLE
- Draw or insert a picture for your “Three Sisters Garden”.
- Be sure to include your name or the group names.

Page 2 - Life Cycle of a Plant:

- Complete a labeled drawing that identifies the life stages of one of the “Three Sisters” plants (corn, beans, or squash)
- Seed → germination → seedling → adult plant → pollination (back to seed)
- Does your plant need wind or insects for pollination?

Page 3 - Special Needs

- Discuss the special needs of the “Three Sisters” plants?
 - Light energy
 - Water / moisture
 - Nutrients
 - Air

Page 4 - Three Sisters Companion Planting

- How did you prepare the growing space for the Three Sisters?
- How do the plants benefit and compliment each other when grown together?

Page 5 - Plant Diversity

- Are all the leaves of your individual plant species exactly alike? If you notice some differences you have discovered plant diversity! Draw or do a rubbing of 3-4 leaves to study the leaves' shape and size; are there some subtle differences in color; is there a soft fuzz on some of the leaves?
- Discuss the similarities and differences you notice for the corn, beans and squash. Include your rubbings or pictures of them. What conclusions do you draw from your observations?

Page 6 - Nutrients

- What nutrients can you get from each of the Three Sisters? Importance of each plant as a source of food?

Page 7 - Growth Chart and Observations

- Share your recorded growth Chart and other observations for each of the Three Sisters during their growing season. Make sure you note important dates like:
 - Preparing a growing area - what did you do?
 - Date planted? Why?
 - Other observations during growing season.
 - Date harvested? How was your crop?

DATE	CORN	BEANS	SQUASH	OTHER NOTES

The above chart is a suggested idea for you to use and expand upon. You will need more than one Slide or page to complete this detailed information. The more details you include in this section of your Diary, the more useful it will be.

Page 8 - Recipe

- What recipe would you like to try with your harvest of corn, beans and/or squash?

Page 9 - Gratitude Card (optional)

- What would you write about your harvest in a Gratitude card for Thanksgiving? Who will receive your card?

Page 10 - Bibliography

- Copy and paste the URL for any pictures or information that you collected from the internet onto a BIBLIOGRAPHY Slide, Doc or record it in your written Diary.

Three Sisters Companion Planting

Marking Rubric



Objectives	Excellent	Proficient	Satisfactory	Limited
<p>Title Page</p> <p>Slide includes your or your group names and a catchy image</p>	Fully captures the attention of the audience. Topic has a clear focus.	Captures the attention of the audience. Topic is focused.	Few audience members seem interested. Topic focus is vague.	Audience is not captured. No topic focus.
<p>Organization</p>	Extremely well organized. Information is clearly represented and the project shows exceptional effort in appealing to the audience.	Well-organized. Information is well represented and the project shows good effort in appealing to the audience.	Somewhat organized. Information is fairly represented and the project shows satisfactory effort in appealing to the audience.	Poorly organized. Information is poorly represented and the project shows little effort in appealing to the audience.
<p>Information</p>	Students showed a comprehensive understanding of the topic; their information was accurate and well researched, and their assignment was well supported by facts.	Students showed an understanding of the topic, their information was accurate, and their assignment was supported by facts.	Students showed a basic understanding of the topic, but their research was incomplete, and/or their assignment was not supported by facts.	Students demonstrate poor or irrelevant understanding of the topic; they did not appear to have done much research, and their assignment was not supported by facts.
<p>Preparation</p>	Students created a clear plan and carefully chose roles/tasks for each team member; they managed their time well and worked together to share the workload.	Students had a rough plan and tasks for each team member; they generally managed their time and worked together to share the workload.	Students would have benefitted from clearer role and task assignments as well as better time management.	Did not work well with other group members throughout the project. Students did not create a clear plan or assign roles and did not manage their time well.
<p>Presentation</p>	Includes 12 - 14 slides. Information on slides is kept short and expands on information in attached videos and/or audios.	Includes 10 - 11 slides. Information on slides contains many sentences and group has some difficulty explaining ideas beyond the slide information in attached videos and/or audios.	Includes 9 slides. Information on slides contains many sentences and group has difficulty explaining ideas beyond the slide information in attached videos and/or audios.	Includes less than 9 slides. Information on slides contains many sentences and group does not expand on information presented on slides in attached videos and/or audios.

