Plant Heredity

Introduction

In this lesson, middle school students will use Indian corn to show how different traits are passed from parent to offspring using basic genetic inheritance. This lesson focuses on the concepts of probability, traits, and different outcomes of Punnett squares.

Grade Level: 8 – 10
Time Needed: 55 - 60 minutes

Learning Objectives

After completing this lesson, students will be able to:

1. Discuss how plants have dominant and recessive traits

2. Utilize a Punnett square to determine possible outcomes of offspring for corn plant

3. Differentiate between phenotype and genotype

Materials

- ☐ Indian corn on the cob for each group
- ☐ Student worksheet

Vocabulary

Allele – different forms of traits (P,p).

Dominant trait –
trait that is always expressed. Represented with a capital letter (P).

Genotype –
the genetic makeup or the combination of alleles that determines a specific trait.

Heredity – the passing of traits from parents to offspring.

Phenotype –
the observable traits or characteristics of an organism; it physical appearance.

Recessive trait –
trait that is only expressed if the dominant allele is not present. It is represented with a lower case letter (p).

Instructional Process

1. Obtain enough Indian corn for groups of two.
2. Students will only use one ear at a time. Label half of them A and half of them B.
3. Make copies of the Student Lab Sheet and distribute to students.
4. Verbally "walk through" the steps of the lab activity and explain what is happening at each step. Highlight the need to be precise in all steps of the lab activity.
5. Have students complete the lab activity and answer the discussion questions.

Supplemental Content – Explanation of the Plant Heredity Lab

1. In corn, purple kernel (seed) color is dominant to yellow kernel color. Each kernel on the cob represents one of the offspring of the parents. By studying the kernels on an ear of corn, you can determine the genetic makeup and the appearance of the parents. You will be working in groups of two. Each group should select an ear of corn coded either A or B and complete the following procedure. You will complete both ears of corn study, so when you are finished with one, exchange it for the other.

2. Choose one member of your group to be the recorder and the other is the observer. The observer will say the color of each kernel (purple or yellow) and the recorder will make a tally mark on the table in the correct spot. Use a dissecting pin to mark the kernel in which you start. Then tally the kernel colors row by row until you get back to your starting row (you may want to have a second pin to mark the row you are on). Be sure to handle the ears of the corn carefully to avoid loosening any kernels from the cob. Continue reading off the color of the kernels until all are accounted for.

3. To complete the data table, total the tally marks in each category. Then calculate the ratio of the purple to yellow seeds. Remember: purple is dominant over yellow.

4. Repeat steps two and three with the other type of ear. Exchange team jobs so the recorder becomes the observer and the observer becomes the recorder.

5. Look at your data tables and make a hypothesis concerning what you think the genetic makeup is (dominant or recessive) and what the appearance is (yellow or purple) of the parents.

6. Student will complete the questions and the lab data chart.

Follow-Up Questions

1. What type of inheritance was expressed in the corn kernels simple dominance, incomplete dominance or codominance?
2. If you had a red flower and a white flower, do you think you could mate those and get a pink flower, or would you just get a red and a white? Why? (For reference, this depends on the source, if a plant can exhibit incomplete dominance then you could mate a white and red to get a pink, otherwise the principle of dominance would create some red and some white or all red depending on if the parents were pure or not flower color.)
3. Why do you think Indian corn looks different from field corn?

4. Do you look exactly like one of your parents? Why or why not? Do you think this applies to plants as well? Why or why not?

Student Sheet – Plant Heredity

In corn, purple kernel (seed) color is dominant to yellow kernel color. Each kernel on the cob represents one of the offspring of the parents. By studying the kernels on an ear of corn, you can determine the genetic makeup and the appearance of the parents. You will be working in groups of two. Each group should select an ear of corn coded either A or B and complete the following procedure. You will complete both ears of corn study, so when you are finished with one, exchange it for the other.

Procedure

1. Read through the procedure and construct an appropriate data table to record your results.

2. Choose one member of your group to be the recorder and the other is the observer. The observer will say the color of each kernel (purple or yellow) and the recorder will make a tally mark on the table in the correct spot. Use a dissecting pin to mark the kernel in which you start. Then tally the kernel colors row by row until you get back to your starting row (you may want to have a second pin to mark the row you are on). Be sure to handle the ears of the corn carefully to avoid loosening any kernels from the cob. Continue reading off the color of the kernels until all are accounted for.

3. To complete the data table, total the tally marks in each category. Then calculate the ratio of the purple to yellow seeds. Remember: purple is dominant over yellow.

4. Repeat steps two and three with the other type of ear. Exchange team jobs so the recorder becomes the observer and the observer becomes the recorder.

5. Look at your data tables and make a hypothesis concerning what you think the genetic makeup is (dominant or recessive) and what the appearance is (yellow or purple) of the parents.

Data Table

Follow-Up Questions

1. What type of inheritance was expressed in the corn kernels simple dominance, incomplete dominance or codominance?

2. If you had a red flower and a white flower, do you think you could mate those and get a pink flower, or would you just get a red and a white? Why? (For reference, this depends on the source, if a plant can exhibit incomplete dominance then you could mate a white and red to get a pink, otherwise the principle of dominance would create some red and some white or all red depending on if the parents were pure or not flower color.)

3. Why do you think Indian corn looks different from field corn?

4. Do you look exactly like one of your parents? Why or why not? Do you think this applies to plants as well? Why or why not?