Punnett squares
Why do scientists use biotechnology? What are the advantages?

Use Punnett squares to show results from a hybrid cross and determine the genotypic ratios and phenotypic ratios of a hybrid. If a plant breeder is interested in creating a better corn plant, one with some traits from one variety and some traits from another, the traditional method is to cross these two varieties and look for the plants that exhibit the combination of traits desired.

Directions

Use the model (Carolina Biological Supply 17-6810 Monohybrid cross) to complete the activity below.

1. Cross Colored Aleurone (RR) corn with Colorless Aleurone (rr), fill in the Punnett square below to show the F_1 results.

	R	R
r		
r		

    R R × r r
    a. What are the resulting genotypes?
    b. What are the resulting phenotypes?

2. When you cross two of the offspring from above, what will be the result in the F_2 generation?

	R	r
R		
r		

    R r × R r
    a. What are the resulting genotypes?
    b. What are the resulting phenotypes?

    Count the kernels on the cob to see what the ratio is.

Use the model (Carolina Biological Supply 17-6900 Dihybrid cross) to complete the activity below.

3. Cross Colored Aleurone (RR), Starchy (SU/SU) corn with Colorless Aleurone (rr), Sweet Endosperm (su/su), fill in the Punnett square below to show the F_1 results.

	R Su	R Su	R Su	R Su
r su				
r su				
r su				
r su				

    R R SU / SU x r r su / su
    a. What are the resulting genotypes?
    b. What are the resulting phenotypes?

4. When you cross two of the offspring from above, what will be the result in the F_2 generation?

	R SU	R su	r SU	r su
R SU				
R su				
r SU				
r su				

5. How long would it take for a farmer to accomplish this amount of crossing on his/her own?

6. Look up seed chipping, a technique discovered by Monsanto. How much time does that take off of the typical hybridization cycle?

7. Look for other techniques being used to cut the time it takes to make new hybrids (i.e. DNA markers and genome mapping). Describe how these methods are helping reduce the time to create new lines that will have increased resistance to weed pressure, pests and drought.