

The Use of a Dihybrid Indian Corn Cross to Reinforce and Foster Appreciation of Gregor Mendel's Work

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Introduction and Objectives: Indian corn is an excellent material for teaching Mendel's Laws. It has readily observable traits and a large enough sample size per ear to approximate Gregor Mendel's famous ratios, especially when class results are pooled. Carolina Biological Supply offers a kit (FA-17-6380: \$139.95) that includes 15 segregating ears of purple/yellow, starchy/sugary dihybrid cross. They also offer a variety of other crosses such as red/white and waxy/non-waxy that can be purchased separately (for \$8 or \$9) and used as unknowns. The materials can be used over again for any number of years.

One of my objectives, apart from reinforcing Mendel's Laws, is to foster an appreciation of the hard tedious work that so often accompanies the brilliant flash of insight that makes the scientific headlines. Students will spend about 45 minutes counting and tabulating: Mendel spent his lifetime doing just that. In addition, it is a wonderful opportunity to point out that as a mathematician, Mendel thought in mathematical terms.

Background: Corn endosperm typically is either yellow or white. It has an outer layer called the aleurone which contains some protein. The aleuronic layer is surrounded by the outermost layer, the pericarp, which is transparent. Sometimes the aleuronic layer contains pigments which mask the color of the endosperm below, therefore any color other than yellow or white would be dominant.

Corn endosperm can also be either starchy or sugary. Sugary endosperm loses water to evaporation, causing a shriveled appearance. Starchy endosperm retains its rounded shape. Starchy is dominant.

Uses of this Activity: This activity can be used at just about any level from middle school to college. For younger students, the teacher could teach the unit first and then use the activity as a reinforcement. For more mature students, the teacher could lead a discussion centered around students' observations about the corn first, before revealing which alleles are dominant. In their teacher's manual, Carolina also includes an opportunity to conduct a chi square analysis of the students' data.

Lab Activity: Students work in pairs to tabulate phenotypes. Each team then posts their results on the chalkboard (see chart below). Once all data are in, students can calculate what the expected numbers would have been using the 9:3:3:1 ratio.

Phenotype	purple/starchy	purple/sugary	yellow/starchy	yellow/sugary	total
Actual count					
Expected					

Students should be able to reconstruct the genotypes of the P generation, the F1 generation, and the F2 generations.