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Maize Education Outreach

The National Science Education Standards (NRC, 1996) recommend an integrated approach to education; that is, combining science, history, culture, language, and other aspects of education into a unified curriculum. These practices foster a deeper understanding of scientific concepts by appealing to the students on many different levels (whether they are more inclined toward the sciences or the social sciences), presenting topics as unified pictures rather than isolated facts, and making the concepts seem more relevant to real life.

Maize lends itself extremely well for use as an educational tool, and particularly to an integrated education approach. Scientifically, maize is one of the best examples of crop domestication and an excellent visual example of genetic inheritance. Due to its large size and fast growth, it is a good demonstration of the plant life cycle, and is also a good example of agricultural techniques such as intercropping. Maize can be used in education on many levels: while an elementary school child can learn about food and plants from growing maize in the school garden, a college student can use maize to study transposons. Furthermore, maize has played an important role throughout history and in many cultures, most particularly that of Native American and Meso-American peoples (Viola and Margolis, 1991). Finally, Barbara McClintock's fame as a woman scientist makes maize a good example of the impact of women in science.

Thus, maize has the potential to be a useful educational tool integrating many disciplines and key concepts. We, as a part of the NSF-funded Molecular and Functional Diversity in the Maize Genome project, plan to take advantage of this in a project that will use maize as a way to present scientific, historical, and cultural concepts to middle/high school students. While there are several educational web sites about maize, including the National Corn Growers Association Education site (<http://www.ncga.com/education/main/index.html>), and that of one of our project members, the Buckler lab site (<http://www.maizegenetics.net/>), many students do not have ready access to a computer, or the time or inclination to read through information in a text format. This project will literally bring the many-faceted story of maize to the students. We will construct mobile "story boards" to be placed in the hallway display cases of selected schools. These story boards will contain pictures and real examples of a diverse array of maize and teosinte. Simple pictorials and brief text boxes will explain the domestication of maize both from a historical perspective and a genetics perspective. A brief pictorial description of the maize life cycle will be included, as will cultural and historical uses of maize, in particular those related

to Native American and Meso-American cultures. These story boards will be made in sections that are easy to assemble and disassemble, making it possible to rotate the boards through a large number of schools. A list of relevant web resources for additional information and an email contact will be given in case the students have questions. To introduce the story board a presentation will be arranged at each school. This presentation will also include information about career opportunities available in plant genomics related fields, not only giving the students educational information but also introducing them to real scientists and the option of science as a career. In addition, a packet of seeds of various maize and teosinte types will be made available to teachers in case they would like to plant out a display garden (if this option coincides with their school year).

Schools will be selected near each of the PIs home institutions, but only in either very rural areas, or in high minority/resource poor areas (as in the case of Irvine, CA, which has a limited rural population but large Latino communities). Schools on or near Native American reservations or in areas of high Latino populations will be especially targeted, increasing the numbers of minority, rural, and resource poor students that we will impact. These schools will be unlikely to have been reached by other university outreach programs, thus we will be able to have a much larger impact than by simply targeting local schools. Middle-high school principals will be contacted, and will help select the appropriate target grade(s) in each school, depending on which the material is more relevant to, and appropriate placement of the story boards. The boards will be transported and assembled in the schools by one of the PIs, graduate students or the outreach director, introduced with a presentation, and left for several weeks. In this way we estimate that we can reach a minimum of three schools per year, possibly reaching as many as several thousand rural students with the story of maize. Dr. Fulton will contact the schools and coordinate this part of the project.

To complement the project's outreach to the middle/high school level, we will also be employing a minimum of nine undergraduate students and three graduate students per year. We will aim to include a high number of minority students in this number by contacting the minority office on each campus to announce the positions.

More Resources:

- National Research Council (1996) National science education standards. Washington, D.C.: National Academy Press. Also available at <http://www.nap.edu/html/nses/html>.
- Viola HJ and Margolis C (1991) Seeds of change: a quincennial commemoration. Washington, D.C.: Smithsonian Institution Press.

For more information concerning the outreach activities of the Molecular and Functional Diversity of the Maize Genome project, please visit <http://www.panzea.org> or contact Theresa Fulton at tf12@cornell.edu.