Bioengineering and You

By Eric Mitcheltree, Muncy High School, Bloomsburg, PA

Standard Statements: 4.5.10.B – Analyze health benefits and risks associated with integrated pest management
4.5.10.C - Analyze the efforts of increased efficiency in agriculture through technology.

Suggested Level: 9-12

Content Objectives: Students will be able to
1. Compare and contrast two views of biotechnology
2. Evaluate their views of biotechnology
3. Describe one product produced by biotechnology

Assessment Strategies:
1. Performance checklist
2. Written summaries and evaluation

Background:
This activity will examine various views of biotechnology. It is a self-discovery activity in which the students learn new information as they progress and then teach this new information to the other students in the class. This activity will be done with biology students after completing reproduction and genetic units.

Learning Objectives:
1) Learn benefits and risks of biotechnology
2) Identify their feelings on biotechnology
3) Learn the history of a bioengineered product, how it was engineered and another fact about it

Materials Needed:
1. Computer lab access

Procedure (Student Handout):

Introduction to the Problem

A local farmer has come to you for assistance. He has been hearing opposing positions on the topic of biotechnology and bioengineering. He came to you after discovering your in depth knowledge of reproduction and genetics. He would like your team to find out if biotechnology/bioengineering is safe and ethical and to describe in as much detail as possible one biotechnological product he could use in agriculture (animals and plants). He is limited on time so presentations should be about 5 minutes in length with each member of the team participating equally.

Procedure

1) Using the Internet read the sites http://www.whybiotech.com/en/whatis/con56.asp?MID=3 and http://www.btinternet.com/~nlpwessex/Documents/gmagric.htm and then decide if you feel biotechnology in agriculture is safe or not and at least one reason why.

2) Searching the Internet find one agricultural product produced by biotechnology/bioengineering to present to the farmer (class) for implementation in his business. Include in the presentation the following: 1) name of product and advantage(s) over traditional products of the same type, 2) history of the product,

how the product was engineered, where the product is currently being used and 3) any other interesting fact your team found on the product.

Each team will have a unique product to present. First come; first serve (product name on the board or overhead film). For example two teams in the same class may not both do Bt corn.

Timeline

Day 1: Background, Introduction of Problem, How assessed. HW: Read http://www.btinternet.com/~nlpwessex/Documents/gmagric.htm

Day 2: Team read whybiotech.com and discuss (compare and contrast articles) and safe or not.
HW: Individually write a paragraph (no more than the front of one page in readable size) explaining why you feel biotechnology is safe and effective or not.
HW: Group decides which product or topic to be used

Day 3: Topics on board, research topic: Gather, sort and sift information
HW: Finish research

Day 4: Synthesize information collected, research to fill in any missing content, write rough draft (outline of presentation)
HW: Finish rough draft of presentation, practice presentation (about 5 min.)

Day 5-6: Class Presentations: self, peer and teacher evaluations

Suggested Sites

These sites are to help you get started on your team's research. They are by no means to be your only research, just a starting point.

http://www.accessexcellence.org/AB lots of info. about biotechnology
http://www.asm.org/pasrc/bioengineeredfoods.htm statement from microbiologists re: bioengineered foods
http://www.nalusda.gov/bic/BTTOX/bttoxin.htm#pla all kinds of info. on bioengineered crops
http://www.whybiotech.com many new examples of bioengineered crops
http://www.usda.gov/agencies/biotech/index.html USDA's biotechnology site
http://agriculture.tusk.edu/biotech/crntpro.html current research on new transgenic plants
http://www.nalusda.gov/bic/BTTOX/bttoxin.htm about Bt bacterium
http://www.scisoc.org/feature/BtCorn/Top.html Bt corn
http://filebox.vt.edu/cals/cses/chagedor/cotton.html Bt cotton
http://filebox.vt.edu/cals/cses/chagedor/soybean.html Transgenic soybean
http://www.nalusda.gov/ttic/tektran/data/000008/74/0000087418.html Transgenic soybean
http://www.crop.cri.nz/psp/articles/docs/gm_crops/pottrans.htm Transgenic potatoes
http://www.agnic.org/pmp/1997/plb9701.html blight resistant potatoes
http://www.theage.com.au/news/20000115/A26050-2000Jan14.html Golden rice
http://alembic.nal.usda.gov/is/pr/1997/970102.htm Bioengineered wheat
http://www.crop.cri.nz/psp/articles.htm short articles to be found within the site on a variety of genetically manipulated crops
http://www.usnews.com/usnews/issue/000814/yard.htm news article about designer genes in various types of plants (roses, lawn grasses, etc.) with lost of links
http://www.nalusda.gov/pgdic/Probe/v5n1/lead.html edible vaccine in potatoes
http://www.nbiap.vt.edu/articles/mar9804.htm edible vaccine for diabetes
http://www.slackinc.com/child/idc/199701/vaccines.htm edible vaccine in bananas
http://www.centerforfoodsafety.org/facts&issues/gefish.html a biased article on bioengineered fish
http://www.natural-law.ca/genetic/NewsMay-Oct97/GENews9-2milk-BSE.html bioengineered milk
http://www.fmi.org/media/bg/bst.html another bioengineered milk
http://www.exnet.iastate.edu/Pages/ansci/ultrasound/BEEF1.html biotechnology and beef
http://www.absglobal.com/pr1222.htm cloning of agricultural animals
http://gameday.onlineathens.com/stories/022800/hea_biotobacco.shtml biotechnology and tobacco
http://www.agbiotechnet.com/reviews/JAN99/HTML/Carneiro.htm biotechnology and coffee
http://www.ecf.toronto.edu/~dattani/pp_presentations/insulin/index.htm bioengineered insulin

Grading

5 pts. Discussion and research performed on task (Day 2 and 3)

10 pts. Paragraph summary (not longer than the front of one page) on you views of biotechnology after reading materials

Paragraph Summary Performance Checklist

4 pts. Synopsis of both articles and an explanation containing 1 reason why you feel biotechnology is safe or not

4 pts. Synopsis of one article and an explanation containing 1 reason why you feel biotechnology is safe or not

2 pts. An explanation containing 1 reason why you feel biotechnology is safe or not

0 pts. No written paragraph turned in on Day 3

10 pts. Presentation: See performance list rubric

Performance List for Biotechnology Internet Research Module Presentation

Names _____

Topic _____

	Performance Criteria	Assessment			
		Points	**Self**	**Teacher**	**Other(s)**
1.	Presentation contains an agricultural product made using biotechnology or bioengineering	2			
2.	Presentation contains a description of the history of the product (its use)	2			
3.	Presentation contains how the product was engineered	2			
4.	Presentation contains another fact about the product your group found interesting **OR** your groups views of the product	2			
5.	Each member participates equally in the presentation Name: Name: Name:	2	_____ _____ _____	_____ _____ _____	_____ _____ _____
6.	BONUS: Presentation incorporates the use of PowerPoint	2			

Comments: