Identifying Career Opportunities in Agricultural Biotechnology

Unit: Recognize the Historical, Social, Cultural, and Potential Applications of Biotechnology

Problem Area: Identifying Major Innovations, Historical Developments, and Potential Applications of Biotechnology in Agriculture

Lesson: Identifying Career Opportunities in Agricultural Biotechnology

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify careers associated with biotechnology, and provide a description of each.

2. Identify the types of companies and institutions that provide employment in agricultural biotechnology.

3. Recognize the education and skills necessary to succeed in a career in agricultural biotechnology.

Resources. The following resources may be useful in teaching this lesson:


<http://www.whybiotech.com/about/members.asp>.


<http://www.ca.uky.edu/students/welcome/ag_biotechnology.asp>.

E-unit(s) corresponding to this lesson plan. CAERT, Inc.  

Hazarika, Gitanjali. “Jobs in Agriculture Biotechnology Industry,”  


<http://agribiotech.info/about-us/land-grant-institutions>.


### Equipment, Tools, Supplies, and Facilities

- Overhead or PowerPoint projector
- Visual(s) from accompanying master(s)
- Copies of sample test, lab sheet(s), and/or other items designed for duplication
- Materials listed on duplicated items
- Computers with printers and Internet access
- Classroom resource and reference materials

### Key Terms. The following terms are presented in this lesson (shown in bold italics):

- agricultural experiment station
- agronomist
- bioinformatics
- biostatistician
- breeder
Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Draw three columns on the board, and label them (1) Careers in Agricultural Biotechnology, (2) Education Required, and (3) Employment Skills Needed. Have students brainstorm and fill in the columns. Next, ask students the kinds of places that might offer positions for people interested in biotechnology. Also, have them brainstorm where they might attend an institution of higher learning to prepare for a career.

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Identify careers associated with biotechnology, and provide a description of each.

Anticipated Problem: What are some careers in biotechnology, and what are descriptions of those careers?

I. With the increase in research and development (R&D), careers in agriculture-based biotechnology offer many opportunities. Besides people with strong scientific and technological expertise, also needed are good administrators and good salespeople with strong communication skills. The vastness of this growing industry requires people with varying skills and educational levels. Careers in biotech can be divided into science related and non-science related.
A. Science-related jobs are filled by people qualified in molecular biology, plant transformation and tissue culture, biochemistry, plant genetics, pathology, entomology, recombinant DNA, horticulture, floriculture, dairying, poultry farming, fishery, and agronomy. With the advent of bioinsecticides, biofertilizers, and biofuels, agricultural biotechnologists are challenged with meeting the needs of farming while causing minimal harm to the earth.

1. Research and development
   a. A **research scientist** is the lead scientist who conducts basic scientific research in a university, government lab, or industry. Many times the research scientist’s own ideas for new products have been the impetus that started a company. Research scientists bring specialized expertise and in-depth knowledge in a particular field of science. They develop new methods and technologies for project advancements. Research scientists are usually responsible for identifying inventions for patents and designing their own experiments. They participate in conferences and contribute writings to scientific journals. They are supported by research associates or assistants who conduct scientific investigations involving data collection, analysis, and interpretation. Writing technical reports is part of their job.

   (1) An **agronomist** is an agricultural scientist who works with plants to solve issues of producing food, creating healthier food, reducing the environmental impact of agriculture, and creating energy from plants. Agronomists use biotechnology to find ways to solve these issues. They may specialize in areas such as plant breeding, weed control, irrigation, and drainage.

   (2) An **entomologist** is a scientist who studies insects. Entomologists are heavily involved in developing pest management strategies in biotechnology.

   (3) A **plant pathologist** is a scientist who studies plant diseases caused by pathogens (infectious agents) and environmental conditions that influence diseases.

   (4) A **molecular biologist** is a scientist who studies life at the cellular level, merging the fields of genetics and biology. Molecular biologists concentrate on interactions of the cell, focusing on DNA and gene function and expression.

   b. Employees with special scientific skills are needed to support the research being conducted.

   (1) A **breeder** is a person who mates carefully selected animals or plants to reproduce special characteristics. Biotechnology animal breeders use artificial insemination (the placing of sperm in the reproductive tract of a female) and embryo transfer (the placing of an embryo in the uterus of a female) techniques to breed livestock. Biotechnology plant breeders use recombinant DNA and RNAi techniques to select plants with certain traits for acceleration of reproduction for product development. A breeder may develop patents and long-range goals for an animal or plant breeding department.
(2) A **media prep technician** is a person who prepares media for biological cultures and maintains records to track experimental procedures.

(3) A greenhouse assistant is responsible for monitoring and maintaining optimal conditions for plants growing in a greenhouse. The operations of the greenhouse might also be this person’s responsibility.

(4) An animal caretaker attends to any animals in the manufacturing process.

2. Clinical research
   a. A clinical research administrator or coordinator is responsible for data entry and validation. Clinical research administrators or coordinators may work with medical or veterinary physicians during clinical trials to clarify questionable events. They may also be responsible for auditing. They coordinate the development plan, schedule, and provide updates on progress.
   b. A clinical data specialist is responsible for collaborating with many departments to organize clinical data studies and report trends of data sets.
   c. A **biostatistician** is a person who analyzes databases and prepares reports for publications.
   d. An animal handler takes care of experimental research animals on a daily basis. He or she cleans animal cages and grooms and observes the animals.
   e. An animal technician takes care of research animals on a daily basis. He or she may perform surgery, oversee animal supplies, and observe animal health. An animal technician maintains records and follows regulatory requirements.
   f. A **technical writer** is a person who writes and edits standard operating procedures, protocols, and lab procedure manuals and complies with regulations in all documentation.

3. Manufacturing and production
   a. Workers in manufacturing and production actually make the products or deliver the services that a company sells. Scientific, engineering, industrial, and mechanical skills are needed. Detailed reports are produced by these employees. Depending on the company or institution, the jobs can vary greatly.
      (1) A **product development engineer** is a person who designs, develops, and enhances existing products and processes. Good labor and manufacturing practices are a responsibility. There may also be contact with outside vendors.
      (2) A production planner makes sure deadlines are developed and production stays on schedule to produce the final product. He or she also keeps management informed of progress.
A manufacturing engineer or technician monitors the product from start to finish, including packaging and the estimating of production costs.

An instrumentation technician calibrates, maintains, and troubleshoots equipment needed in production.

4. Quality control
   a. A quality assurance engineer is a person who monitors the entire production process to make sure good manufacturing and standard operating procedures are followed at all times.
   b. An environmental health and safety specialist is a person who develops and monitors safety programs. He or she inspects plant areas, new equipment, and raw materials and monitors exposure to possibly toxic substances.

B. Non-science–related jobs carry out many different functions in the day-to-day operation of a company or institution.

1. Information systems
   a. Bioinformatics is a science that combines biology, computer science, and information technology into a single discipline. Computer specialists trained in bioinformatics manage the massive amount of biological information found in data banks.

2. Marketing and sales
   a. Market researchers assess the need for a product, the number of people who will most likely buy it, and the price they would be willing to pay.
   b. Marketing personnel find new markets and seek new ways to advertise and promote products.
   c. Salespeople deal directly with selling products to customers. They are representatives of their company. They relay feedback from the customers to their company.

3. Regulatory affairs
   a. A regulatory affairs specialist prepares documents for submission to regulatory agencies and for inspections and recommends strategies for the earliest possible approval of trials.
   b. A regulatory specialist is usually a person with scientific background who keeps track of all the federal and state regulations that apply to the company and makes sure the company complies with them.

4. Legal affairs
   a. Legal specialists prepare and track patent applications. A patent is a set of exclusive rights given to the owner to market a new invention for a certain length of time, eliminating the possibility of a competitor making the same product.
   b. Patent attorneys are attorneys who specialize in patent law.

5. Public relations, communications, and training
   a. Public relations personnel are effective communicators to the public.
b. Technical writers write internal or external reports that are easy enough for the lay public to understand.

c. Trainers organize and conduct technical training, usually within the company.

6. Management and support

a. Managers organize and supervise activities. Many start out as scientists or engineers and work their way up.

b. Support personnel are also required. They include administrative assistants, accountants, information management specialists, and computer technicians.

Teaching Strategy: Use VM–A to present a simple listing of science– and non-science–related careers in biotech. Also use VM–B, which is a more detailed listing with examples of careers found in the categories of VM–A. Use LS–A to have students research several careers in agricultural biotechnology. Use LS–B to have students read several career profiles and evaluate the one they find most interesting. If you have a biotech company in your area, invite a representative from the company to visit your class and discuss career opportunities.

Objective 2: Identify the types of companies and institutions that provide employment in agricultural biotechnology.

Anticipated Problem: What kinds of companies and institutions provide employment in agricultural biotechnology?

II. Agricultural biotechnology employment opportunities are available in private companies and in public (government-based or -supported) institutions and agencies.

A. Private companies that provide products and services in plant agricultural biotechnology

1. The following companies, which are among the top private employers in plant agricultural biotechnology, have formed the Council for Biotechnology Information. Three of them are headquartered in the United States, and three of them are based in Europe.

a. BASF Plant Science, headquartered in Limburgerhoff, Germany, is involved in plant biotechnology. It has eight sites in five countries of Europe and North America and employs about 700 people. Efforts of BASF Plant Science are in more efficient agriculture, renewable raw materials, and healthier nutrition for humans and animals.

b. Bayer CropScience is headquartered in Monheim, Germany. It is involved in crop protection, nonagricultural pest control, seeds, and plant biotechnology. Bayer CropScience offers products for modern, sustainable agriculture and for nonagricultural applications.
c. Dow AgroSciences LLC, based in Indianapolis, Indiana, provides technologies for crop protection, pest and vegetation management, seeds, traits, and agricultural biotechnology.

d. DuPont’s Pioneer Hi-Bred business is headquartered in Des Moines, Iowa. It provides access to advanced plant genetics in nearly 70 countries. Pioneer Hi-Bred offers customized solutions for farmers, livestock producers, and grain and oilseed processors.

e. Monsanto Company is headquartered in St. Louis, Missouri, and is focused on agriculture and the success of farmers. Its technology-based solutions and agricultural products improve farm productivity and food quality through plant breeding, plant biotechnology, and other applications of modern science to agriculture.

f. Syngenta is based in Basel, Switzerland. Its goal is to provide sustainable agriculture through innovative research and technology. Syngenta is involved in crop protection and high-value commercial seeds. The company employs over 21,000 people in more than 90 countries.

2. Cargill is a leading private employer in plant agricultural biotechnology. Based in Minneapolis, Minnesota, the company employs 159,000 people in 68 countries. It is involved with producing biofuels and feed stock for animals.

B. Private companies that provide products and services in animal agricultural biotechnology

1. Select Sires, in Ohio, is a company that provides services in dairy and beef cattle genetics. It prepares semen and embryos for breeding.

2. Advanced Cell Technology (ACT) has cloned cows. It is also researching ways to prevent the rejection of cells transferred from one living organism to another (immune rejection). ACT, like many facilities, uses animal models to pursue its research. The company’s headquarters are in California, with laboratory facilities in Massachusetts.

3. Genencor is involved in developing eco-friendly enzyme products used in the agricultural processing of food, feed, and biofuels. It is based in Rochester, New York. Genencor employs 1,474 people in more than 80 countries.

C. Public (government-based or -supported) institutions and agencies

1. Land-grant institutions are a group of U.S. agricultural colleges and universities formed through legislation back in 1862. They were given land on which to build their schools, and in exchange they offered practical subjects, such as farming, to the public. Today, they conduct research in agricultural biotechnology and make the information about biotechnology available to the public. Iowa State University was the first land-grant university. There are currently almost 60 colleges and universities, where many people are being employed in scientific research in agricultural biotechnology (http://agribiotech.info/about-us/land-grant-institutions).

2. An agricultural experiment station is a government-supported research center or field laboratory that conducts scientific investigations in animal and plant sciences. There are more than 50 facilities in the United States. Their goal is
to solve problems and suggest improvements in agriculture that are of practical concern to U.S. citizens. They were formed in conjunction with, and are an extension of, land-grant institutions. Employees work directly with farmers, ranchers, and suppliers in the field. Agricultural experiment stations provide a testing ground for proof of concept research by college faculty. They also provide hands-on learning for undergraduate and graduate students. Principal investigators, research assistants, and animal and plant technicians work at these facilities.

3. The U.S. Department of Agriculture employs people who are knowledgeable in agricultural biotechnology.
   a. Extension Services inform people about current developments in agriculture and related subjects. The facilities are operated by land-grant universities.
   b. Many divisions, such as the Agricultural Research Service (ARS) and the Food and Safety Inspection Service (FSIS), are highly involved in the production and regulation of biotech animals and crops.

**Teaching Strategy:** Use VM–C to give examples of private and public biotech employers. Contact a biotech company, if there is one in your area, to set up a tour or to arrange for a speaker to come to your class. Using LS–C, have students create a poster advertising a land-grant institution to share and display. Have a college poster fair.

**Objective 3:** Recognize the education and skills necessary to succeed in a career in agricultural biotechnology.

**Anticipated Problem:** What education and what skills are necessary to succeed in a career in agricultural biotechnology?

III. There are many jobs in biotechnology starting at a high school entry level. Many companies, however, provide incentive or reimbursement for additional schooling. By increasing one’s education and experience, one can acquire more responsibility, more independence, and a higher salary.

A. Education
   1. A high school diploma or a GED (General Education Development) certificate is required for entry-level positions, such as laboratory assistants. There is usually on-the-job training for routine experimental operations, such as preparing solutions and media, taking care of lab animals or greenhouse plants, and washing glassware.
   2. A two-year Associate of Applied Science (A.A.S.) degree is required for many production and quality control jobs. Because of the many lab experiences in biotechnology programs, graduates from technical colleges usually have an edge for employment.
   3. A four-year bachelor’s (B.S. or B.A.) degree is required for research associates and more technical positions, such as specialized technicians, technologists,
manufacturing or production assistants, product development engineers, and quality control analysts. Biotechnology technicians usually have a B.S. or M.S. degree in a related science area. Their jobs vary depending on the place of employment. Earning a degree in the physical or biological sciences is very helpful. Suggested areas are general biology, genetics, biochemistry, microbiology, botany or zoology, molecular and cellular biology, chemistry, chemical engineering, environmental science, toxicology, pharmacology, computer science, agricultural science, sales, and marketing. It is also helpful for future employment to secure summer jobs in industry or on research projects while a student.

4. A master’s degree offers the same opportunities as a bachelor’s, but the pay is more, and advancement to a supervisory position is more likely.

5. A doctoral degree—Doctor of Philosophy (Ph.D.), Medical Doctor (M.D.), or Doctor of Veterinary Medicine (D.V.M.)—offers a career in basic scientific research. Research scientists design research processes and direct the activities of bachelor’s and master’s employees. Positions include research scientist, senior scientist, principal scientist, research or scientific director, and vice-president for research.

B. Technical skills required in agricultural biotechnology include basic laboratory skills, knowledge of universal biological lab techniques (cloning, media preparation, and sterile technique), safety skills, quality control skills, and instrument analysis skills.

C. General employability skills required are reading, writing, speaking (being an effective communicator), mathematical and statistical skills, computer skills, and interpersonal skills.

D. Related job skills that promote employment are technical writing skills, problem-solving skills, and mechanical aptitude. People applying in sales and marketing have an edge if they also have a background in science education.

Teaching Strategy: Use VM–D to summarize education needed for agricultural biotech employment. Use VM–E to present skills needed for a job in agricultural biotechnology.

■ Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle.

■ Application. Use the included visual master(s) and lab sheet(s) to apply the information presented in the lesson.

■ Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.
Answers to Sample Test:

Part One: Matching

1. b
2. d
3. a
4. e
5. c
6. f

Part Two: True/False

1. T
2. T
3. F
4. T
5. T
6. T
7. F
8. F

Part Three: Short Answer

1. Any two answers in the following areas: research and development, clinical research, manufacturing and production, quality control (see VM–B).
2. Any three answers from among the following: basic laboratory skills; universal biological lab techniques, such as cloning, media preparation, sterile technique; safety skills; quality control skills; instrument analysis skills (see VM–E).
3. Answers will vary. Here are some possible responses.
   a. A scientific background helps employees work better with all members of the company.
   b. The employee will have better comprehension of research and development.
   c. The language of science must be understood to write or read reports or to place orders for equipment or supplies.
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Part One: Matching

Instructions: Match the term with the correct definition.

a. agronomist  
b. research scientist  
c. plant pathologist  
d. product development engineer  
e. breeder  
f. regulatory specialist

1. A person who is the lead scientist in research and development and designs his or her own experiments
2. A person who designs, develops, and enhances existing products and processes
3. An agricultural scientist who works with plants to solve issues of producing food, creating healthier food, reducing the environmental impact of agriculture, and creating energy from plants
4. A person who mates carefully selected animals or plants to reproduce special characteristics
5. A scientist who studies plant diseases
6. A person with scientific background who keeps track of all the federal and state regulations and makes sure the company for which he or she works complies with them

Part Two: True/False

Instructions: Write T for true or F for false.

1. An entomologist is a scientist who studies insects.
2. A biostatistician analyzes databases and prepares reports.
3. All the jobs in a biotech company are filled by people with scientific backgrounds.

4. A patent gives exclusive rights to the owner to market a new invention without competition for a certain length of time.

5. Agricultural biotech companies are located all over the world.

6. The first land-grant institution was Iowa State University.

7. Agricultural experiment stations are privately owned and not accessible to farmers and ranchers.

8. The only jobs available in agricultural biotechnology are for those people who have a master’s or doctoral degree.

**Part Three: Short Answer**

*Instructions: Answer the following.*

1. Name two science-related jobs in agricultural biotechnology.

2. List three technical skills needed for employment in agricultural biotechnology.

3. Why would it be an advantage for a non-science–related employee in an agricultural biotechnology company to have some laboratory experience?
TWO TYPES OF CAREERS IN BIOTECHNOLOGY

♦ Science-related jobs
  - Research and development
  - Clinical research
  - Manufacturing and production
  - Quality control

♦ Non-science–related jobs
  - Information systems
  - Marketing and sales
  - Regulatory affairs
  - Legal affairs
  - Public relations, communications, and training
  - Management and support
CAREERS IN BIOTECHNOLOGY

♦ Science-related jobs
  ■ Research and development
    ♦ Research scientists (agronomist, entomologist, plant pathologist, molecular biologist)
    ♦ Support for scientists (breeder, media prep technician, greenhouse assistant, animal caretaker)

♦ Clinical research (clinical research administrator or coordinator, clinical data specialist, biostatistician, animal handler, animal technician, technical writer)
  ■ Manufacturing and production (product development engineer, production planner, manufacturing engineer or technician, instrumentation technician)
  ■ Quality control (quality assurance engineer, environmental health and safety specialist)

♦ Non-science–related jobs
  ■ Information systems (computer specialists for bioinformatics)
  ■ Marketing and sales (market researchers, marketing personnel, salespeople)
  ■ Regulatory affairs (regulatory affairs specialist, regulatory specialist with scientific background)
  ■ Legal affairs (legal specialists, patent attorneys)
  ■ Public relations, communications, and training (public relations personnel, computer technicians, technical writers, trainers)
  ■ Management and support (managers, administrative assistants, accountants, information management specialists, computer technicians)
EMPLOYMENT IN AGRICULTURAL BIOTECHNOLOGY

A. Private

1. Plant
   a. BASF Plant Science, Germany
   b. Bayer CropScience, Germany
   c. Dow AgroSciences LLC, Indiana
   d. DuPont, Iowa
   e. Monsanto Company, Missouri
   f. Syngenta, Switzerland

2. Animal
   a. Select Sires, Ohio
   b. Advanced Cell Technology (ACT), California
   c. Genencor, New York

B. Public (government based or supported)

1. Land-grant institutions
2. Agricultural experiment stations
3. U.S. Department of Agriculture
   a. Extension Services
   b. Divisions
      (1) Agricultural Research Service (ARS)
      (2) Food and Safety Inspection Service (FSIS)
EDUCATION REQUIRED FOR AGRICULTURAL BIOTECHNOLOGY EMPLOYMENT

High school diploma or GED (General Education Development) certificate

- Entry-level positions
  - Laboratory assistants
    - Preparing solutions and media
    - Washing glassware
    - Taking care of lab animals or greenhouse plants

Two-year Associate of Applied Science (A.A.S.) degree

- Production and quality control jobs
- Technical colleges give an edge toward employment
Four-year bachelor’s (B.S. or B.A.) degree

- Research associates
- Technical jobs
  - Specialized technicians
  - Technologists
  - Manufacturing or production assistants
  - Product development engineers
  - Quality control analysts
- Biotechnology technicians (some have an M.S. degree)
  - Physical sciences
  - Biological sciences

Master’s degree (M.S.)

- Jobs similar to bachelor’s
  - Pay is more
  - Possible advancement to a supervisory position
Doctoral degree—Doctor of Philosophy (Ph.D.), Medical Doctor, (M.D.), or Doctor of Veterinary Medicine (D.V.M.)

- Design research processes
- Direct the activities of bachelor’s and master’s employees
- Research scientist, senior scientist, principal scientist
- Research or scientific director
- Vice-president for research
SKILLS NEEDED FOR A JOB IN AGRICULTURAL BIOTECHNOLOGY

Technical skills

♦ Basic laboratory skills
♦ Knowledge of universal biological lab techniques
  ■ Cloning
  ■ Media preparation
  ■ Sterile technique
♦ Safety skills
♦ Quality control skills
♦ Instrument analysis skills

General employability skills

♦ Reading
♦ Writing
♦ Speaking (being an effective communicator)
♦ Mathematical and statistical skills
♦ Computer skills
♦ Interpersonal skills

**Related job skills that promote employment**

♦ Technical writing skills
♦ Problem-solving skills
♦ Mechanical aptitude
♦ Background in science education
Career Explorations

Purpose

The purpose of this activity is to investigate careers related to agricultural biotechnology.

Objectives

1. Evaluate five careers.
2. Identify a career most interesting to you.

Materials

♦ lab sheet
♦ writing utensil

Procedure

2. At the bottom of the page, under “Industry,” select “Biotechnology”; then click on “Search Career Explorer.”
3. Choose five biotechnology careers that sound interesting to you, and fill in the following table.

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Job Description</th>
<th>Education Required</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
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4. Choose the one career about that sounds the most interesting, and answer the following:
   a. Why does this career sound interesting to you?

   b. What types of courses in high school and college will prepare you for this career?

   c. What are the working conditions for this job?

   d. What skills do you need for this job?
Name ________________________________

Career Profiles in Biotech

Purpose

The purpose of this activity is to explore the profiles of several different people who are employed in the biotechnology industry.

Objectives

1. Access a Web site in which career profiles of several people in the biotech industry are posted.
2. Evaluate various careers in terms of a profile that might interest you.

Materials

♦ lab sheet
♦ writing utensil

Procedure

2. Choose four of the profiles, and read what each person says about his or her job.
3. Provide the information requested for each profile.

   a. Person’s name: _________________________________________________________________
      Job title: _____________________________________________________________________
      Required education: _____________________________________________________________________
      Would you enjoy this job? ______
      Why or why not? _____________________________________________________________________

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### 4. Rate the above jobs in order of your interest (1—high interest, 4—low interest).

<table>
<thead>
<tr>
<th>Job</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>_____</td>
</tr>
<tr>
<td>b.</td>
<td>_____</td>
</tr>
<tr>
<td>c.</td>
<td>_____</td>
</tr>
<tr>
<td>d.</td>
<td>_____</td>
</tr>
</tbody>
</table>

### 5. For your number 1 choice, write down three things you would need to do to prepare for this job as a career.

<table>
<thead>
<tr>
<th>Task</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>a.</td>
<td></td>
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<tr>
<td>b.</td>
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<td>c.</td>
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</tbody>
</table>
Land-Grant Colleges and Universities Poster

Purpose

The purpose of this activity is to explore the course and degree offerings at a land-grant college or university in the United States that would support a career in agricultural biotechnology.

Objectives

1. Investigate the course and degree offerings at a land-grant college or university in the United States that would support a career in agricultural biotechnology.
2. Make a poster advertising the institution and its offerings.
3. Display and share posters to increase awareness of land-grant colleges and universities and their offerings.

Materials

♦ lab sheet
♦ poster-size paper
♦ markers
♦ ruler
♦ pen or pencil
♦ paper
**Procedure**

1. Go to the Web site http://agribiotech.info/about-us/land-grant-institutions. Your teacher will assign or let you choose one land-grant institution listed at the site. Each student in class will have a different institution.

2. Click on the link to the institution, and investigate the course and degree offerings that would support a career in agricultural biotechnology. Take notes that will enable you to present your findings on a poster.

3. Design a colorful and attractive poster that would both advertise and encourage others to enroll in the institution. Be sure to include the following:
   a. Name of the institution
   b. Location (city and state)
   c. Degree or degrees offered that would support a career in agricultural biotechnology
   d. One interesting or unique thing about this institution
   e. An image
   f. Color

4. Create a college poster fair by displaying and sharing your poster.