Explore Bt Curriculum and Summer Biotech Workshops

Order Your Free Bt Curriculum Today

A new Bt crops curriculum prepared by Iowa State's Office of Biotechnology and ISU Extension is ready for distribution. The curriculum, titled *Bacillus thuringiensis: Sharing Its Natural Talent With Crops*, is about how genes from the soil bacterium *Bacillus thuringiensis* (Bt) have been genetically engineered into crops to provide insect resistance. The curriculum was written for grades 9-12 and extension youth and adult audiences.

Prepared with support from a USDA grant studying the social, economic, and ethical aspects of biotechnology, the curriculum contains four modules:

- Module I – The Science Behind Bt Crops
- Module II – Insect-Resistant Crops Using Bt
- Module III – Production Issues for Bt Crops
- Module IV – Ethical, Social, and Legal Issues of Bt Crops

Each module is designed to be used independently or with the other modules. For educators, each module contains background information, lesson plans geared to the National Science Education Standards and 4-H skills, Internet resources, and overhead transparency masters. Informational handouts and activity handouts that can be photocopied for students are included.

The new curriculum is available in three ways:

Register for Summer Workshops

Teachers in public or private schools or educators who work with youth in 4-H or other community programs are invited to attend one or more biotech workshops offered at Iowa State University this summer. Staff development or graduate credits will be offered for each workshop.

The workshops will be held in the Biotechnology Outreach Education Center on the Iowa State campus in Ames. Iowa teachers can receive stipends of $50 per day to help cover their costs of attending. ISU Extension educators/personnel can receive travel reimbursements of up to $50 per day to help cover their expenses.

Materials and stipends for the workshops are funded through a grant from the U.S. Department of Agriculture, by the ISU Office of Biotechnology, and by the Iowa Biotechnology Association that is a stakeholder participant in the USDA grant. The $3.7 million USDA grant was awarded to a consortium of nine land-grant institutions in Minnesota, North Dakota, South Dakota, Wisconsin, and Iowa through

(continues on p. 2)
Summer Workshops — continued from p. 1

the USDA’s Initiative for Future Agriculture and Food Systems. The consortium is addressing economic, ethical, and social aspects of agricultural biotechnology. Each of the summer workshops will feature a bioethics component, and the June 25-27 workshop will be devoted entirely to bioethics.

For details about the Biotechnology Education workshops, please contact Lori Miller at 515-294-9818, toll-free in Iowa at 800-643-9504, or e-mail her at lorimill@iastate.edu. To register, contact Lori or complete the form on p. 7 and mail or fax it by May 30 to the address indicated on the form.

Biotechnology Education Workshop I for Science Educators
Biotechnology Outreach Education Center, ISU, Ames
June 9-13, 2003
2 staff development credits - $20 and/or
1-2 ISU graduate credits - $280 per credit
$200 stipend available for Iowa schoolteachers ($50 per day)
Travel reimbursement available for ISU Extension educators/personnel (up to $50 per day)

This workshop course is directed at teachers who want to gain a basic knowledge of biotechnology. Teachers will learn how to prepare and instruct the laboratories in DNA extraction and quantification from various sources, DNA transformation, DNA fingerprinting, bioinformatics, and more. Educators will prepare and perform the lab protocols as the students would do in class. Techniques for encouraging classroom bioethics discussions will be featured.

Biotechnology Education Workshop I for Family and Consumer Sciences Educators
Biotechnology Outreach Education Center, ISU, Ames
June 17-19, 2003
1 staff development credit - $20 and/or
1 ISU graduate credit - $280
$150 stipend available for Iowa schoolteachers ($50 per day)
Travel reimbursement available for ISU Extension educators/personnel (up to $50 per day)

This workshop course focuses on the basics of biotechnology and how it can be applied in human nutrition and health. The basic technical knowledge and skills in this workshop will be useful in helping family and consumer sciences educators better understand and deliver information about biotechnology to their students. Techniques for encouraging classroom bioethics discussions and information about GMO testing in food will be featured.

Bioethics Workshop for Educators
Biotechnology Outreach Education Center, ISU, Ames
June 25-27, 2003
1 staff development credit - $20 and/or
1 ISU graduate credit - $280
$100 stipend available for Iowa schoolteachers ($50 per day)
Travel reimbursement available for ISU Extension educators/personnel (up to $50 per day)

This course is designed for educators who are interested in discussing bioethics with their students or extension audiences. The focus will be on ethical issues in biotechnology, especially agricultural biotechnology, but other topics relevant to both agriculture and human health will be covered. Specific topics include ethical issues concerning transgenic plants, such as Bt crops and vitamin A rice, transgenic animals for xenotransplantation or ecologically-friendly meat production (“Enviropigs”), and human stem cell research. Students will work through activities and case studies that they can take home and use with their classes.

Biotechnology Education Workshop I for Agricultural Education Instructors
Biotechnology Outreach Education Center, ISU, Ames
July 9-11, 2003
1 staff development credit - $20 and/or
1 ISU graduate credit - $280
$150 stipend available for Iowa schoolteachers ($50 per day)
Travel reimbursement available for ISU Extension educators/personnel (up to $50 per day)

This course is a workshop focused on the basics of biotechnology and how it can be applied to agriculture. The basic technical knowledge and skills in this workshop will be useful in helping agricultural educators better understand biotechnology and how it will affect their curriculum and profession. Laboratory investigations and instruction will give educators experience with DNA extraction and transformation, DNA fingerprinting, chymosin, Bt corn, GMO testing, and more. Techniques for encouraging classroom discussions of bioethics and issues surrounding “pharming” will be featured. The workshop starts at noon on July 9 and completes a full week of agricultural education activities on campus.
Biotechnology Education Workshop II – Advanced Workshop for Science, Agriculture, and Family and Consumer Sciences Educators

Biotechnology Outreach Education Center, ISU, Ames
July 14-18, 2003
2 staff development credits - $20 and/or
1-2 ISU graduate credits - $280 per credit
$200 stipend available for Iowa school teachers ($50 per day)
Travel reimbursement available for ISU Extension educators/personnel (up to $50 per day)

This advanced workshop is open to science, agriculture, and family and consumer sciences educators who have attended one of the previous biotechnology workshops. Educators will learn how to prepare and instruct advanced laboratories in biotechnology. Activities will include showing marker gene expression, DNA isolation, recombinant DNA techniques, DNA amplification, restriction analysis of DNA, bioinformatics, sequencing, genomics, and more. Educators will prepare and perform the lab protocols that their students could do in class. Techniques for encouraging advanced classroom bioethics activities will be featured.

To register for the course, please contact Lori Miller, 515-294-9818, toll-free in Iowa 1-800-643-9504, e-mail lorrmill@iastate.edu, or complete the registration form on p. 7 and mail or fax it to the address indicated on the form.

The class enrollment is limited to 20. The registration deadline is May 30, 2003.

Bioethics Online Course

The Office of Biotechnology’s popular online bioethics course “Biotechnology Ethics” has been updated and will be offered this summer from June 9 through August 1. The course is designed for high school teachers, extension personnel, and others who educate youth and adult audiences about the ethical issues surrounding biotechnology.

The course, taught entirely on the Internet, gives teachers and extension professionals the background, resources, and confidence they need to lead ethics discussions with their classes or extension audiences. A minimum of 15 hours online, plus an additional 15 hours of reading, writing, research, and taking exams is required. Participants can earn one graduate credit from Iowa State University for $280. One staff development credit for $20 is available for Iowa participants, and also may be available for those from other states.

All course work can be done on a home computer. Course participants will be introduced to ethical theory before moving on to evaluating biotechnology issues. The course incorporates activities on specific topics about plant biotechnology, transgenic animals, and biotechnology in human health. Course participants are welcome to use these activities in their own teaching or outreach work. There will be extensive online discussion with other educators. The ethical theories learned in the course also can be applied to topics other than genetic engineering.

Kristen Hessler, a faculty member of the Department of Philosophy and Religious Studies and bioethics outreach coordinator at Iowa State University, is the course instructor. For more information about course content, please contact her at 515-294-7576 or e-mail her at khessler@iastate.edu.

To register for the course, please contact Lori Miller, 515-294-9818, toll-free in Iowa 1-800-643-9504, e-mail lorrmill@iastate.edu, or complete the registration form on p. 7 and mail or fax it to the address indicated on the form.

The class enrollment is limited to 20. The registration deadline is May 30, 2003.

Bt Curriculum – continued from p. 1

- Educators in Iowa can contact the Office of Biotechnology (see address in the box on p. 1) to order a free CD-ROM that contains PDF files of the curriculum. The files can be opened and printed using Adobe® Acrobat® Reader®, a free software program that works on either Mac or PC computers.

- Free PDF files of the curriculum also can be downloaded from the Internet and printed by accessing the curriculum at http://www.biotech.iastate.edu/publications/ed_resources/biotech_curriculum.html. Look under the section for grades 9-12.

- To order printed versions of the 324-page curriculum that have been three-hole punched and are ready to be placed into a notebook, contact the Extension Distribution Office, 119 Printing and Publications Building, ISU, Ames, Iowa 50011-3171, ph. 515-294-5247, fax 515-294-2945, or e-mail pubdist@iastate.edu. Order forms can be downloaded from http://www.extension.iastate.edu/pubs/Order.html. Ask for publication number 4H 949. The cost per copy is expected to be about $15, plus shipping and handling.

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BOEC in Action
About this time each year, the BOEC begins making plans for the summer. This year’s selection of teacher-centered workshops will be the best ever. Added to the summer schedule is a bioethics workshop led by Kristen Hessler. For dates and more information about the bioethics workshop, see Kristen’s column on p. 5.

At the BOEC, we found plenty to do over Iowa State’s winter break. We updated curriculum materials, repaired equipment, and made general preparations for the busy spring and summer sessions. In the early part of the semester at ISU, the departments of agricultural studies, biology, and education bring their pre-service teachers to the BOEC for training in biotechnology techniques and principles.

Despite some cold temperatures and the holidays, several groups took advantage of the year-round services offered by the Office of Biotechnology and the BOEC. Visits from Southeast Polk High School in Runnells, St. Augustin School in Des Moines, the AP Biology teachers from AEA 11, homeschoolers from Perry, and Iowa State’s Women in Science and Engineering Program highlighted our BOEC activities. My winter travel has included going to Des Moines for a Saturday TAG program and Syngenta Seed Company inservice training, to Cedar Rapids and Mason City for teacher inservices, and to Philadelphia, PA, to present “DNA in My Food” at the annual conference of the National Science Teachers Association.

News from the Biotechnology Outreach Education Center
By Mike Zeller
Outreach Coordinator

By this time of year, you probably have your second semester schedules nearly finalized. Some of you have scheduled a visit to the Biotechnology Outreach Education Center (BOEC) or have invited me to your school. The BOEC is a great place to bring your class for some hands-on biotechnology, but don’t forget that in this time of tight budgets I can visit your school with most of our activities. Spring is a busy time for the BOEC, so if you want to schedule a visit to ISU or want me to visit your school, you need to contact us immediately (see contact info. on p. 1). Electrophoresis kits and free lab supplies also are in great demand during the spring. Get your supply orders to Lori Miller early, and reserve a kit well ahead of time at your Area Education Agency (AEA) or regional extension office. Planning ahead will allow us to serve you better.

What’s New?
We have been testing the new equipment in the BOEC computer lab and our bioinformatics activities these past several months. Everything is working great and is ready for school groups. If you are interested in giving your students experience in bioinformatics, contact us for a visit. I anticipate these activities will be on our web site before the 2003 fall semester. If you would like to try these activities in your classroom this spring, contact me at 515-294-5949 or e-mail mzeller@iastate.edu.

The Office of Biotechnology has just finished a curriculum titled Bacillus thuringiensis: Sharing Its Natural Talent With Crops. This curriculum was designed specifically with teachers and extension educators in mind and is geared to the National Science Education Standards and 4-H skills. The curriculum has four modules on the science behind Bt crops; insect-resistant crops using Bt; production issues; and ethical, social, and legal issues. The curriculum was written for grades 9-12 and extension youth and adult audiences. There are background information sections for instructors, student handouts, overhead transparency masters, and Internet ideas in each module. Each of the modules can be delivered separately or combined into a unit. For more information about receiving a free copy of the curriculum, see the article on p. 3.

On April 2 and May 8, I will lead an Iowa Communications Network presentation from Iowa Public Television (IPTV) in Johnston, titled “Genetic Engineering in Iowa.” The presentation will be delivered at two different times each day. For more information, visit the “Explore More: Genetic Engineer-
In closing

Make sure to mark your calendar with the summer workshop dates. I hope you will plan to attend one or more of the workshops. Even the most seasoned teachers can benefit from updating their knowledge and skills in this rapidly changing science. Have a great spring!

Educational Opportunities

Bioethics Outreach Coordinator

By Kristen Hessler

In June, the Office of Biotechnology will sponsor ISU’s first-ever bioethics workshop for extension and classroom educators. It is a perfect opportunity for you to come to campus and learn about bioethics with other educators and experts from the ISU faculty.

The summer bioethics workshop is designed to help educators who discuss biotechnology to be able to address associated ethical issues. To this end, we will discuss ethical theory, work on bioethics activities that you can use in your own classes or workshops, hear lectures from experts in science fields related to bioethics, and discuss tips on how to address controversial issues with your classes or extension audiences.

In particular, we will discuss ethical issues concerning transgenic animals, biotechnology in human health, and plant biotechnology, including Bt corn and pharmaceutical crops.

The high visibility of bioethics in the news has made many people curious about new scientific developments and their ethical implications. Your students and extension audiences will appreciate being able to discuss these issues with you!

The workshop will run from noon on Wednesday, June 25, through noon on Friday, June 27. Staff development or graduate credit is available (see p. 2 for details). I am very much looking forward to hosting this workshop and hope that you will join us in June!

Visit the BOEC During Veishea

The Biotechnology Outreach Education Center (BOEC) will host an open house from 9 a.m. to 5 p.m. during Veishea on Saturday, April 12. The BOEC is located in room 1320 of the Molecular Biology Building on the northwest side of campus. If you plan to bring your students to the BOEC open house or want to stop by yourself, please contact Lori Miller for more information at 515-294-9818, toll-free in Iowa 1-800-643-9504, or send an e-mail message to lorimill@iastate.edu. Veishea is Iowa State University’s annual student-run festival.

National DNA Day on April 25

The National Human Genome Research Institute (NHGRI) is planning a month-long series of events and celebrations in the United States to mark the sequencing of the human genome and the 50th anniversary of the description of the DNA double helix by James Watson and Francis Crick.

Teachers and students are invited to join in the celebration by focusing on genetics for the day or the whole month of April. The NHGRI is developing lesson plans, activities, and curriculum supplements that will be made available online at http://www.genome.gov/Education/. In addition, the NHGRI has established an e-mail list for teachers who want more information and updates about the educational resources. To subscribe to the e-mail list, visit the NHGRI web site at http://www.genome.gov/page.cfm?pageID=10006287.

Science in Ag Day Nominations Due

March 7 is the deadline for high school science and agriculture teachers to return their nominations of students to attend this year’s Science in Agriculture Day at Iowa State University. The event, to be held on April 22, is sponsored by the College of Agriculture for students in grades 9-12. Students will have the opportunity to learn how science interacts with agriculture. They will explore Iowa State’s campus, the agriculture curriculum, and career opportunities. Teachers should have received nomination materials by mail in January or can obtain the forms online at http://www.agstudent.iastate.edu/Science.htm. For more information, please contact event coordinator Beth Foreman at 515-294-4548 or e-mail bforeman@iastate.edu.
Recombinant DNA: Dual Antibiotic-Resistance Genes

Revised Procedure for Four 80-Minute Class Periods

The tip for this issue is by Dave Millis of Edgewood-Colesburg High School. He has revised the sequence of steps in the “Recombinant DNA: Dual Antibiotic-Resistance Genes” laboratory protocol provided by the ISU Office of Biotechnology to allow the student lab portion of the protocol to be done in four 80-minute class periods instead of the original six 40-minute class periods. If you have questions, please phone Dave Millis at 563-928-6412 (school) or e-mail him at dmillis@edge-cole.k12.ia.us.

The pre-lab information, materials, background, and procedure steps for the revised protocol are the same as they appear in the lab guide posted on the Office of Biotechnology web site at http://www.biotech.iastate.edu/publications/lab_protocols/DNA_Transformation_recom.html. Teachers can contact the Office of Biotechnology for a copy. The original sequence for six 40-minute class periods appears on the left below. The revised sequence that can be done in four days is on the right.

<table>
<thead>
<tr>
<th>Original Protocol for Student Lab</th>
<th>Revised Protocol for 80-Minute Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1 – Plasmid Digests</strong></td>
<td><strong>Day 1 – Plasmid Digests</strong></td>
</tr>
<tr>
<td>Do steps 1 through 4.</td>
<td>Do steps 1 through 3.</td>
</tr>
<tr>
<td><strong>Day 2 – Competent Cell Procedure</strong></td>
<td><strong>Competent Cell Procedure</strong></td>
</tr>
<tr>
<td>Do steps 1 through 9.</td>
<td>Do steps 1 through 5 while the plasmid digest incubates.</td>
</tr>
<tr>
<td><strong>Day 3 – Ligation</strong></td>
<td><strong>Ligation</strong></td>
</tr>
<tr>
<td>Do steps 1 through 6.</td>
<td>Do steps 1 through 4 while the cell pellet from the competent cell procedure is on ice.</td>
</tr>
<tr>
<td><strong>Day 4 – Recombinant Transformation</strong></td>
<td><strong>Competent Cell Procedure</strong></td>
</tr>
<tr>
<td>Do steps 1 through 6.</td>
<td>Do steps 6 through 9 while the ligation incubates.</td>
</tr>
<tr>
<td><strong>Day 5 – Recombinant Transformation Plating</strong></td>
<td><strong>Recombinant Transformation</strong></td>
</tr>
<tr>
<td>Do steps 1 through 3.</td>
<td>Do steps 1 through 6, same as original.</td>
</tr>
<tr>
<td><strong>Day 6 – Recombinant Transformation Results</strong></td>
<td><strong>Recombinant Transformation Plating</strong></td>
</tr>
<tr>
<td>Do steps 1 and 2.</td>
<td>Do steps 1 through 3, same as original.</td>
</tr>
</tbody>
</table>

**Notes for the Instructor About the Revised Protocol**

Day 1 – If the schedule allows, teachers might have students prepare the mid log culture 3-4 hours before class. Timing here is pretty important. If class is first period, then you just have to get up early. If so, while the mid log is preparing, the rest of the pre-lab prep can easily be done in the time for incubation. Day one is hectic, even with 80-minute blocks. Require the students to record the time for all the incubations and refrigerations so they can keep the procedures moving in a timely manner.

Day 2 – Incubation for 3-4 hours after completion is important, even though it is tempting to just go ahead and plate out the culture in the time remaining (that strategy has yet to work very well for this instructor). Plating only takes about half of the block period. After the Recombinant Transformation procedure is done, there might be time for the students to quickly prepare and pour the plates for the next day’s activity, depending on class size and experience and instructor preference.

Day 3 – This procedure takes only about 20 minutes at any time during the block, so it can be done wherever it fits into the day’s other activities.

Day 4 – Recording and discussing results usually takes about 30 minutes, if the results were positive. If the results were marginal or negative, a discussion of what went wrong could take longer. Teachers should check the results before class so as to mesh this with any other activities planned for the block period.
Registration Form for 2003 Biotechnology Education Summer Workshops and Online Bioethics Course

Registrations due by MAY 30, 2003

Name ______________________________________________________________________________________________________

School district or extension area ________________________________________________________________________________

Subject areas taught___________________________________________________________________________________________

Home (summer) mailing address ___________________________________________________________________________________

Work phone ____________________    E-mail__________________________________    Home phone _______________________

I would like to register for the following Biotechnology Education Workshop(s) to be held at ISU in Ames:

_____ Workshop I for Science Educators, June 9-13    _____ Bioethics Workshop for Educators, June 25-27

_____ Workshop I for Family and Consumer Sciences,    _____ Workshop I for Agriculture Educators,
   June 17-19                        July 9-11

_____ Advanced Workshop II for Science, Agriculture, and Family and Consumer Sciences Educators,
   July 14-18

I would like to register for the following online course that I can take on the Internet from home:

_____ Biotechnology Bioethics, June 9 - August 1

Credit available: 1-2 staff development credits AND/OR 1-2 graduate credits
(See workshop descriptions on p. 1 and online course description on p. 3 for details.)

Credit payment and housing information will be sent to you when your registration is received.

Register early! Class sizes are limited. Return this registration form by mail or fax before May 30 to:

Lori Miller
Office of Biotechnology
1210 Molecular Biology Building
Iowa State University
Ames, Iowa 50011-3260

Fax: (515) 294-4629 • Phone: (515) 294-9818 or toll-free in Iowa 1-800-643-9504 • E-mail: lorimill@iastate.edu

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About the ISU Public Education Program in Biotechnology.

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To Contact the Program
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