Annual Assessment Report
for
Academic Subject Certificate in Plant Bio-Resources Technology
December 2005

Prepared by Ingelia White
Overall project overview:

The fiscal years 2001 to 2004 grants from the USDA-CSREES have enabled Windward Community College (WCC) to develop and offer an Academic Subject Certificate (ASC) in Bio-Resources and Technology (BRT). The certificate covers two program areas: Plant Biotechnology, and Bio-Resource Development and Management (http://www.wcc.hawaii.edu/degrees/plantTech.html and http://www.wcc.hawaii.edu/degrees/bioresources.html ). New courses developed for these two programs also provide diversity in the college’s academic programs such as AA in Liberal Arts, CC in Agriculture Technology and ASC in Hawaiian Studies.

The goal of the Plant Biotechnology Program, under the support of USDA First Year Consortium FY 2003 – 2004, is to provide students with knowledge and technical skills to enter the workforce in plant biotechnology and to stimulate bioprocessing agribusiness entrepreneurship. The goal of the Bio-Resource Development and Management Program is to provide knowledge and skills in developing, conserving, and managing Hawaii’s natural resources, and promoting sustainable agriculture. The major focus of the USDA-CSREES FY 03 – 04 sub-project at WCC is to increase enrollment, retention and graduation numbers among students (particularly Native Hawaiians) taking courses listed in these two programs.

Project objectives:

The objectives of the programs are to provide education and workforce training for students to succeed in Hawaii’s agribiotechnology job market, to ensure a safe food supply and environment, to promote agribusiness entrepreneurship, sustainable agriculture, and productive, efficient use of natural resources.

Progress toward project objectives:

All goals and objectives were met.

1. All newly developed courses in the Plant Biotechnology Program (PBP), include BOT 210 (Phytobiotechnology) was offered in Summer 2002 and Fall 2004, BOT 205 (Ethnobotanical Pharmacognosy) in Spring 2005, and BIOL 275/275L (Cell and Molecular Biology/Lab) in Fall 2003.

2. The remaining three new courses in the Bio-Resource Development and Management Program (BRDM) were developed and approved in Spring 2005: AQUA 201/201L (Hawaii Fishpond/Lab), BIOL 124/124L (Environment and Ecology/Lab) and GIS 250 (GIS Applications in Environmental Science). Please note that as of Spring 2005, the BRDM Program was no longer supported by the USDA-CSREES. It is now privately funded through the Harold K.L. Castle Foundation.
3. Two guest lecturers were hired. Dr. William McClatchey assisted in chemical extraction of plants used in bioprocessing for the BOT 205 class, and Lora Oshima assisted BOT 205 students in bioprocessing of plants for skin care products in Spring 2005.

4. A research mentor, Dr. Judy Zhu from the Hawaii Agriculture Research Center (HARC) was hired to provide collaborative research and on-the-job training for 3 biotech student research interns (BOT 199/299), Anolani Badua in Spring 2004, Tracy Peters from Spring 2004 – Fall 2004 and Waiete Williams in Spring 2005 to conduct research on Transgenic Cattleyas.

5. Three student interns took Independent Study with their respective mentors:
   - Jamie Iwamoto, Micropropagation of Peperomia sp., BOT 199, Fall 2004.

6. Two student assistants, Gaynette Carvalho-Esprecion and Pamela Gribbins (one student per year) were hired to maintain biotech facilities and laboratories.

7. Purchasing of laboratory equipment and supplies for BOT 210, BIOL 275L and AG 52/152 was completed.

8. The ASC in BRT and its programs are advertised through Power Point presentations in classes and club meetings (i.e. WCC Ambassadors, Orchid Societies, Outdoor Circles etc.), college catalogues, fliers, posters, websites (http://www.wcc.hawaii.edu/degrees/plantTech.html and http://www.wcc.hawaii.edu/degrees/bioresources.html and http://aip.hawaii.edu), college newspapers and UHM Newsletters of the Marine Option Program.

9. A total of 2,821 students took courses listed in the Plant Biotechnology Program, and the Bio-Resource Development and Management Program from Fall 2003 to Summer 2005. The number has increased compared to a total of 2,363 students served in classes offered in the two programs from Fall 2001 to Summer 2003 (see Table 1).

10. The ASC in BRT was initially offered in Spring 2003. The Plant Biotechnology Program has graduated 20 ASC students. Six of them have been working at the Hawaii Agriculture Research Center (HARC), and are currently pursuing Baccalaureate degrees in various biotechnology fields at UHM. Two are working in high-tech agribusiness companies. One ASC graduate received a Master’s degree in Molecular Biosciences and Biosystems Engineering from UHM in Fall 2004 and will be entering the School of Medicine. One graduate will receive two Bachelor’s degrees (Pre-med Studies and Biology) from HPU in Fall 2005. Two students plan to enter School of Pharmacy. Eight other graduates have become
entrepreneurs in tissue culture and/or bioprocessing agribusiness. One entrepreneur, Lora Oshima won first prize in the ‘Social Category’ at UH Business Plan Competition in April 2005 (see Fig. 1).

11. Ten students in the Bio-Resource Development and Management Program (BRDM) have been trained in water quality analysis and ready for employment and are also pursuing Baccalaureate degrees in Marine Biology and Global Environmental Studies at UHM.

Issues affecting progress toward objectives:

1. By Spring 2005, the BRDM Program was no longer supported by the USDA-CSREES. It is now privately funded through the Harold K.L. Castle Foundation. FY 2005 – 2008.
2. The PB and the BRDM programs have attracted both science and non-science majors. From Fall 2003 to Summer 2005, approximately 2,821 students had taken courses listed in both programs.
3. Partnerships have been established with:
   • Faculty and researchers from the College of Tropical Agriculture and Human Resources (CTAHR) and the College of Art and Natural Sciences - Department of Botany at UHM; the Department of Agriculture and the Department of Biology at UH-Hilo. This partnership involves course articulation agreement for seamless student transfer and guest lecturing/mentoring.
   • The UH Hawaii Institute of Marine biology (HIMB) and the Marine Option Program (MOP).
   • The Hawaii Agriculture Research Center (HARC) for research mentoring and on-the-job training.
   • The Department of Pharmacy- University of Indonesia.
   • Biotech companies such as Pioneer HI-Bred International Inc., Syngenta Seeds, Inc., Mera Pharmaceuticals, Hamakua Mushroom co., Hoku International LLC, H&R Nursery, Diamond Head Plants, and Kosaki Orchids for providing on-the-job training and potential hiring.

Plans to further progress of objectives:

1. Partnering with biotech instructors across the UH system to articulate all courses listed for the ASC-BRT in Plant Biotechnology.
2. Introducing the Plant Biotechnology Program to high-school science teachers and students to recruit students.
3. Partnering with WCC Agriculture Technology Program to encourage diversified agribusinesses.
4. To further develop the bioprocessing agribusiness entrepreneurship project.
5. Nurturing relationship with biotech industries to provide on-the-job training and job opportunities.
6. Networking with graduates with significant agribusiness experience to pursue for plant-derived product research and development related to natural and homeopathic skin care production.

Table 1. Number of students enrolled in classes listed in PB and BRDM programs from Fall 2001 – Summer 2005

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Fig. 1. The first prize winner, Hoku International LLC. in ‘Social Category’ at UH Business Plan Competition, April 2005. From left to right: Rod Oshima, Dr. Ingelia White, Lora Oshima, President David McClain, Susie Kuhn, and Jeff Sakai.
Table 1. Number of students enrolled in classes listed in PB and BRDM programs from Fall 2001 – Summer 2005

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Final Technical Report


Project titles:
FY 01 – 02: Bio-Resources and Technology Academic Subject Certificate.
FY 02 – 03: Initial Offering of the Academic Subject Certificate in Bio-Resources and Technology.
FY 03 – 04: University of Hawaii Statewide Agricultural Education, Training and Agribusiness Incubator Project.

Program title: Alaska Native - Serving and Native Hawaiian – Serving Institution

Institution type: ANSI/NHSI

Award amount:
FY 01 – 02 (09/15/01 – 12/14/03): $159,648 (OEP number: 2001 – 05721; Award # 2001 – 38426 – 11497)
FY 02 – 03 (09/15/02 – 03/14/04): $159,402 (OEP number: 2002 – 04286; Award # 2002 – 38426 – 12697)
FY 03 – 04 (09/01/03 – 09/30/05): $101,840 (DUNS No. 965088057)

Principal Investigator (FY 01 – 02 and FY 02 – 03) and Program Coordinator for PB Program (FY 01 – 04):

Ingelia White Ph.D.
Asst. Prof. Botany/Microbiology
Department of Natural Sciences
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Kaneohe, Hi 96744
Tel: (808) 236 – 9102
Fax: (808) 247 – 5362
E-mail: Ingelia@hawaii.edu

Program Coordinator for BRDM Program:
David Krupp Ph.D., Assoc. Prof. Biology

Project Coordinator: Jean Okumura, Prof. Mathematics
Project objectives:

FY 01 – 02:

1. To develop and to seek approval for the Academic Subject Certificate (ASC) in Bio-Resources and Technology (BRT), and its two programs: the Plant Biotechnology (PB) program and the Bio-Resource Development and Management (BRDM) program.

2. To develop new and/or to modify courses for the ASC and offer the following:
   BOT 210 (Phytobiotechnology)
   IS 201 (The Ahupua’a)
   ZOOL 105 (Hawaiian Use of Fish and Aquatic Invertebrates)
   BIOL 171/171L (General Biology I/Lab)
   BIOL 172/172L (General Biology II/Lab)
   BIOL 265/265L (Ecology and Evolutionary Biology/Lab)
   BIOL 275/275L (Cell and Molecular Biology/Lab)
   OCN 121/121L (Physical Environment of the Ocean/Lab)
   OCN 122/122L (Biological Oceanography/Lab)
   OCN 220 (Hawaii Fisheries)

3. To complete and dedicate the Tissue Culture and Plant Biotechnology Laboratory

FY 02 – 03:

1. To start offering the ASC in BRT under the PB and the BRDM programs in Spring 2003.

2. To develop the final new courses for the ASC in BRT:
   BOT 205 (Ethnobotanical Pharmacognosy)
   GIS 250 (GIS Applications in Environmental Science)
   BIOL 124/124L (Environment and Ecology/Lab)
   AQUA 201/201L (The Hawaiian Fishpond)

3. To hire a guest lecturer to team teach BOT 210

4. To hire a research mentor to provide research and training for student research interns

5. To establish partnerships with the UHM and UHH Baccalaureate degree programs to facilitate students’ transfer to respective programs

6. To complete equipping laboratories and supplies for BOT 210, BOT 205, and BIOL 275L
FY 03 – 04:

1. To maximize the offering of courses listed for the ASC in BRT – PB and the BRDM programs

2. To hire a guest lecturer to team teach BIOL 275/275L

3. To hire a guest lecturer to perform plant chemical extraction and analysis for BOT 205

4. To hire a mentor to train and promote agribusiness entrepreneurship

5. To provide education and workforce training in agribiotechnology

6. To ensure a safe food supply and environment

7. To promote sustainable agriculture and productive, efficient use of natural resources

Progress toward project objectives:

All goals and objectives were met.
1. New courses listed in the ASC in BRT from the Plant Biotechnology Program and the Bio-Resource Development and Management Program were developed, approved and offered.

2. The ASC in BRT in both programs has been offered since Spring 2003.

3. The Tissue Culture and Plant Biotechnology Laboratory has been operating since Spring 2003 (see Fig. 1).

4. The following guest lecturers have been hired to assist in teaching:
   BOT 210, Dr. Clifford Morden, Summer 2002
   BIOL 275/275L, Eryn Nakamura, Fall 2003
   IS 201, Dr. Clyde Tamaru, Spring 2004
   BOT 205, Dr. William McClatchey, Spring 2005

5. The following mentors have been hired to assist in research, on-the-job training, and/or entrepreneurship instruction.
   a. Dr. Judy Zhu from HARC assisted in research and training for the following student research interns:
      • Gregory Osterman, Fall 2002 – Spring 2003
      • Erin Yafuso, Fall 2002 – Spring 2003
      • Natalie Kong, Summer 2003 – Fall 2003
      • Anolani Badua, Spring 2004
• Tracy Peters, Spring 2004 – Fall 2004
• Waite Williams, Spring 2005 – Fall 2005

c. Lora Oshima assisted BOT 205 students to create bioprocessing skin-care products.

6. The following student assistants have been hired for the Plant Biotechnology Program to maintain biotech facilities and laboratories from Spring 2002 – Fall 2005:
   • Gregory Osterman, Fall 2001 – Fall 2002
   • Darleen Ordenstein, Spring 2003
   • Gaynette Carvalho-Especion, Fall 2003 – Spring 2004
   • Pamela Gribbins, Fall 2004 – Fall 2005


8. Student research interns enrolled in BOT 199/299 (Independent Study) include:
   • Gregory Osterman “Aquaponic Culture of Manoa Lettuce”. Spring 2002.
   • Marcia Diver “Medicinal Plants of Cambodia”. Summer 2002.
   • Erin Yafuso “Edible Plants of Cambodia”. Summer 2002.
   • Jamie Iwamoto “Micropropagation of Peperomia sp.”. Fall 2004.

9. Student research interns enrolled in ENVST 199/299 (Independent Study) include:

10. Courses listed in the ASC in BRT – Plant Biotechnology Program have been articulated and approved with the UHM Plants and Environmental Biotechnology (PEB) Program, and an articulation agreement with UHH is pending.

11. The ASC in BRT was initially offered in Spring 2003. The Plant Biotechnology Program has graduated 20 ASC students. Six of them have been working at the Hawaii Agriculture Research Center (HARC), and are currently pursuing Baccalaureate degrees in various biotechnology fields at UHM. Two are working in high-tech agribusiness companies. One ASC graduate received a Master’s degree in Molecular Biosciences and Biosystems Engineering from UHM in Fall 2004 and will be entering the School of Medicine. One graduate will receive two Bachelor’s degrees (Pre-med Studies and Biology) from HPU in Fall 2005. Two students plan to enter School of Pharmacy. Eight other graduates have become entrepreneurs in tissue culture and/or bioprocessing agribusiness. One entrepreneur, Lora Oshima won first

12. Ten students in the Bio-Resource Development and Management Program (BRDM) have been trained in water quality analysis and ready for employment and are also pursuing Baccalaureate degrees in Marine Biology and Global Environmental Studies at UHM.

13. Total students enrolled courses listed in the PB and the BRDM programs from Fall 2001 to Summer 2005 is 5,184 (see Table 1).

Products and outcomes:

The WCC Academic Subject Certificate (ASC) in Bio-Resources and Technology (BRT) with its two programs: The Plant Biotechnology (PB) and the Bio-Resource Development and Management (BRDM) have been developed and offered through the USDA-CSREES grants FY 2001 to 2004. The new courses in these programs provide diversity in the college’s existing academic programs.

The PB and the BRDM programs provide education and workforce training for students to succeed in Hawaii’s agribiotechnology job market, to ensure a safe food supply and environment, to promote agribusiness entrepreneurship, sustainable agriculture, and productive, efficient use of natural resources.

Dissemination of products and outcomes:

As a USDA-CSREES consortium grantee, Windward Community College (WCC) coordinates and disseminates its products and outcomes through WCC websites (http://www.wcc.hawaii.edu/degrees/plantTech.html, http://www.wcc.hawaii.edu/degrees/bioresources.html) and UHM-CTAHR consortium website (http://aip.hawaii.edu). Dissemination is also made through campus newspapers, campus newsletters, campus visitations (see Fig. 2), fliers, posters (see Fig. 4 and 5), course catalogues, Ho’olaulea (campus annual festivals) and Power Point presentations in classes and club meetings; Articles in local newspapers (Advertiser and Star Bulletin), and interviews on public televisions (see Fig. 3).

Partnerships and collaborative ventures that resulted from project activities:

Research partnerships and mentorships have been established with researchers and faculty members from:
1. College of Tropical Agriculture and Human Resources (CTAHR) and College of Natural Sciences – Botany Department at UHM for course articulation, research mentoring and guest lecturing activities.
2. Department of Agriculture and Department of Biology at UHH for course articulation.
3. Hawaii Institute of Marine Biology (HIMB) for research mentoring.
4. Marine Option Program (MOP) for research mentoring.
5. Hawaii Agriculture Research Center (HARC) for research mentoring and on-the-job training.

6. Department of Pharmacy – University of Indonesia for collaborative research.

7. Biotech companies such as Pioneer Hi – Bred International, Inc.; Syngenta Seeds, Inc.; Mera Pharmaceutical Co.; Hamakua Mushroom Farm; Hoku International LLC; Diamond Head Plants; Kosaki Orchids; H & R Nursery; and Hawaiian Sunshine Nursery.

8. Grant partnerships are also established with:
   • BRIN (Biomedical Research Infrastructure Network)
   • EPSCoR (Experimental Program to Stimulate Competitive Research)
   • Harold K.L. Castle Foundation

Overall impact on the institution and on the food and agricultural sciences higher education system:

The existence of the ASC in BRT and its two programs, Plant Biotechnology, and Bio-Resource Development and Management at WCC has provided students in Hawaii knowledge and skills required to enter high paying jobs in biotechnology (a National workforce priority) and environmental monitoring.

The Plant Biotechnology Program prepares students to become bioprocessing agribusiness entrepreneurs (careers involving the production, processing and commercialization of edible, medicinal and ornamental plants). It also enables students to further their studies in agribiotechnology related fields such as agriculture, horticulture, aquaculture, and other biological sciences including medicine and pharmacy.

The programs have served both science and non-science majors. More than 5,000 students have enrolled in courses listed in both programs from Fall 2001 to Summer 2005.

Publications/products:

1. Publications associated with the Plant Biotechnology Program (Ingelia White with her students and research collaborators):
2. Publications associated with the Bio-Resource Development and Management Program (David Krupp and his student and research collaborators):


3. Power Point presentations at conferences/meetings:


4. Posters:


White, I. and H. Braffet. 2003. USDA-CSREES. Nine posters showing activities in the following classes for the ASC in BRT – Plant Biotechnology Program: BOT 130, BOT 210, BOT 160, ASC in BRT – PBP, MICRO 140, AG 152, BOT 101, BOT 105, BIOL 275L.


White, I. 2004. USDA-CSREES, WCC – UH Agribusiness Education, Training and Incubator Project – Plant Biotechnology Program (see Fig. 4).


White, I. 2005. USDA-CSREES, WCC Bioprocessing Agribusiness Entrepreneurships Plant Biotechnology Program (see Fig. 5).

5. Flyer/WCC course catalogs:

- Flyer for Bio-Resources and Technology with PB and BRVM programs
- WCC course catalog 2003 – 2004
- WCC course catalog 2004 – 2005
6. Websites:
   - http://www.wcc.hawaii.edu/degrees/plantTech.html
   - http://www.wcc.hawaii.edu/degrees/bioresources.html
   - http://aip.hawaii.edu
   - http://www.hawaii.edu/facultypages.html
   - http://www.wcc.hawaii.edu/usda/Heeia/
   - http://imiloa.wcc.hawaii.edu/white/default.html

Fig. 1. Tissue Culture and Plant Biotechnology Laboratory at WCC.
Fig. 2. USDA-CSREES Program Officers and grantees visiting WCC Plant Biotechnology Program and Bio-Resource Development and Management Program.

Fig. 3. KITV Channel 2 broadcasting with Leslie Wilcox and WCC students performing tissue culture.
Skilled biotech technicians in:
- Green house & field management
- DNA extraction
- Tissue culture
- Elisa
- Genetic engineering
- Pharmacognosy

Fig. 4. USDA-CSREES Plant Biotechnology Program.
Bio-processing agribusiness entrepreneurship is a lucrative business in Hawaii. Partnering with local industries, WCC Plant Biotechnology Program offers bioprocessing entrepreneurship in its curriculum. Students gain knowledge and skill in agribusiness.
CRIS Termination Report

Project titles:
FY 01 – 02: Bio-Resources and Technology Academic Subject Certificate.
FY 02 – 03: Initial Offering of the Academic Subject Certificate in Bio-Resources and Technology.
FY 03 – 04: University of Hawaii Statewide Agricultural Education, Training and Agribusiness Incubator Project.

Program title: Alaska Native - Serving and Native Hawaiian – Serving Institution

Institution type: ANSI/NHSI

Award amount:
FY 01 – 02 (09/15/01 – 12/14/03): $159,648 (OEP number: 2001 – 05721; Award # 2001-38426-11497)
FY 02 – 03 (09/15/02 – 03/14/04): $159,402 (OEP number: 2002 – 04286; Award # 2002-38426-12697)
FY 03 – 04 (09/01/03 – 09/30/05): $101,840 (DUNS No. 965088057)

Principal Investigator (FY 01 – 02 and FY 02 – 03) and Program Coordinator for PB Program (FY 01 – 04):
Ingelia White Ph.D.,
Asst. Prof. Botany/Microbiology
Department of Natural Sciences
Windward Community College
45 – 720 Keaahala Road
Kaneohe, Hi 96744
Tel: (808) 236 – 9102
Fax: (808) 247 – 5362
E-mail: Ingelia@hawaii.edu

Program Coordinator for BRDM Program:
David Krupp Ph.D., Assoc. Prof. Biology

Project Coordinator: Jean Okumura, Prof. Mathematics
Students Funded:

A. Student assistants for Plant Biotechnology Program. Duties include maintaining plants in the climate-controlled greenhouse, preparing and sterilizing media, cleaning glassware in laboratories and maintaining plant tissue culture.

- Gregory Osterman, Fall 2001 – Fall 2002
  Address: 47-039 Kamehameha Hwy, Kaneohe, Hi 96744
  E-mail: osterman@hawaii.edu

- Darleen Ordenstein, Spring 2003
  Address: c/o I. White, Department of Natural Sciences, Windward Community College, 45 – 720 Keaahala Road, Kaneohe, Hi 96744
  E-mail: dordenst@hawaii.edu

- Gaynette Carvalho-Esprecion, Fall 2003 – Spring 2004
  Address: c/o I. White, Department of Natural Sciences, Windward Community College, 45 – 720 Keaahala Road, Kaneohe, Hi 96744
  E-mail: gaynette@hawaii.edu

- Pamela Gribbins, Fall 2004 – Fall 2005
  Address: c/o I. White, Department of Natural Sciences, Windward Community College, 45 – 720 Keaahala Road, Kaneohe, Hi 96744
  E-mail: gribbinspc@hawaii.rr.com

B. Student assistants for Bio-Resource Development and Management Program. Duties include assisting in typing, printing, developing websites and posters

- Lea Hollingsworth, Fall 2001 – Spring 2003
  Address: c/o David Krupp, Department of Natural Sciences, Windward Community College, 45 – 720 Keaahala Road, Kaneohe, Hi 96744
  E-mail: leaeh@hawaii.rr.com

C. Student research interns in Plant Biotechnology Program:

1. Collaboratively mentored by Dr. Judy Zhu at Hawaii Agriculture Research Center (HARC) and Dr. Ingelia White at Windward Community College (WCC) are:

- Gregory Osterman “Papaya Tissue Culture”, Fall 2002 – Spring 2003
- Erin Yafuso “Papaya Tissue Culture”, Fall 2002 – Spring 2003
- Anolani Badua “CyMV Resistant Gene Transformation in Orchids via Agrobacterium tumefaciens LBA 4404, Spring 2004
- Tracy Peters “CyMV Resistant Gene Transformation in Orchids via Agrobacterium tumefaciens LBA 4404, Spring 2004 – Fall 2004
- Waiete Williams “Tissue Culture Preparation for Gene Bombardment”, Spring 2005
- Waiete Williams “CyMV Resistant Gene Transformation in Cattleya Allies via Biolistic Gene Bombardment”, Fall 2005
2. BOT 199/299 students mentored by Dr. Ingelia White at WCC are:
   • Gregory Osterman “Aquaponic Culture of Manoa Lettuce” (in preparation for publication), Spring 2002
   • Marcia Diver “Medicinal Plants of Cambodia” (research report), Summer 2002
   • Erin Yafuso “Edible Plants of Cambodia” (research report), Summer 2002
   • Lora Oshima “Antimicrobial Properties of Peperomia tetraphylla and Its Micropropagation”, Summer 2003 – Fall 2003
   • Jamie Iwamoto “Micropropagation of Peperomia sp.”, Fall 2004

D. Student research interns in Bio-Resource Development and Management Program. ENVST 199/299 students mentored by Dr. David Krupp at WCC are:
   • Lea Hollingsworth “Creation of a Water Quality Website, http://www.wcc.hawaii.edu/usda/Heeia”, Fall 2002
   • Branden Ibara “Water Quality of Kea’ahala Stream” (in preparation for publication), Summer 2003
   • Erin Yafuso “Water Quality of Kea’ahala Stream” (in preparation for publication), Summer 2003

**Guest Lecturer Funded:**

The following guest lecturers/lab assistants have been hired to assists in team-teaching:
1. BOT 210, Dr. Clifford Morden from the Department of Botany, UHM, Summer 2002
2. BIOL 275/275L, Eryn Nakamura, Fall 2003
4. IS 201, Dr. Clyde Tamaru, Spring 2004
5. BOT 205, Dr. William McClatchey, Spring 2005
6. BOT 205, Lora Oshim, assisted in skin care production, Spring 2005

**Faculty Hours Funded:**

1. Dr. Ingelia White (WCC)

As Project Director/Principal Investigator: Directing, developing, monitoring the entire project and coordinating the expenditure of funds, hiring of personnel, supervising, marketing the Academic Subject Certificate (ASC) in Bio-Resources and Technology (BRT) and its programs, and writing Annual, Final Technical, and CRIS Termination reports.

As Program Coordinator in Plant Biotechnology Program (PBP): Writing new course proposals, developing the program, teaching new courses, mentoring student interns, student assistants, guest lecturers, and working in partnerships with faculty members at UHM and UHH to facilitate student transfer and mentoring; with researchers at HARC to provide students on-the-job training and biotech research; and with agribiotech companies to provide training and employment.
Total assigned time and Summer overload: 3,168 hours.
FY 01 - 02: .67 FTE (10 credit assigned time per semester) for Spring 2002 and Fall 2002, and 3 credit Summer overload.
FY 02 – 03: .67 FTE (10 credit assigned time per semester) for Spring 2003 and Fall 2003, and 3 credit Summer overload.
FY 03 – 04: .60 FTE (9 credit assigned time per semester) for Spring 2004 and Fall 2004, and 2 credit Summer overload.

2. Dr. David Krupp (WCC)
Program Coordinator for Bio-Resource Development and Management (BRDM): Writing new course proposals, teaching new courses, developing the program, mentoring student interns and student assistants, and working with UHM faculty to facilitate student transfer.

Total assigned time and Summer overload: 1,440 hours.
FY 01 – 02: .40 FTE (6 credit assigned time per semester) and 3 credit Summer overload.
FY 02 – 03: .20 FTE (3 credit assigned time per semester) and 2 credit Summer overload.
FY 03 – 04: .20 FTE (3 credit assigned time per semester) for Spring 2004 and Fall 2004, and 1 credit Summer overload.

3. Jean Okumura (WCC)
Project Coordinator: Assisting in obtaining the approval of the ASC and in monitoring the progress of the project.

Total Summer overload: 240 hours.
FY 01 – 02: 3 credit Summer overload.
FY 02 – 03: 1 credit Summer overload.
FY 03 – 04: 1 credit Summer overload.

Publications

1. Publications associated with the Plant Biotechnology Program (Ingelia White with her students and research collaborators):
2. Publications associated with the Bio-Resource Development and Management Program (David Krupp and his student and research collaborators):


3. Power Point presentations at conferences/meetings:


4. Posters:


White, I. and H. Braffet. 2003. USDA-CSREES. Nine posters showing activities in the following classes for the ASC in BRT – Plant Biotechnology Program: BOT 130, BOT 210, BOT 160, ASC in BRT – PBP, MICRO 140, AG 152, BOT 101, BOT 105, BIOL 275L.


5. Flyer/WCC course catalogs:

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- http://www.wcc.hawaii.edu/degrees/bioresources.html
- http://aip.hawaii.edu
- http://www.hawaii.edu/facultypages.html
- http://www.wcc.hawaii.edu/usda/Heeia/
- http://imiloa.wcc.hawaii.edu/white/default.html

7. Research reports:

Products and Outcomes:

The WCC Academic Subject Certificate (ASC) in Bio-Resources and Technology (BRT) with its two programs: The Plant Biotechnology (PB) and the Bio-Resource Development and Management (BRDM) have been developed and offered through the USDA-CSREES grants FY 2001 to 2004. The new courses in these programs provide diversity in the college’s existing academic programs.

The PB and the BRDM programs provide education and workforce training for students to succeed in Hawaii’s agribiotechnology job market, to ensure a safe food supply and environment, to promote agribusiness entrepreneurship, sustainable agriculture, and productive, efficient use of natural resources.

One to two semesters of research internships and/or on-the-job trainings under the mentorship of faculty members, researchers and/or bioprocessing agribusiness professionals are provided to students nearing completion of their ASC in BRT from Plant Biotechnology Program. Upon completion of their training, each intern will produce a research paper for publication and/or will be well-prepared for an immediate employment.

Dissemination Activities:

As a USDA-CSREES consortium grantee, Windward Community College (WCC) coordinates and disseminates its products and outcomes through WCC websites (http://www.wcc.hawaii.edu/degrees/plantTech.html, http://www.wcc.hawaii.edu/degrees/bioresources.html) and UHM-CTAHR consortium website (http://aip.hawaii.edu). Dissemination is also made through campus newspapers, campus newsletters, campus visitations, fliers, posters, course catalogues, Ho’olaulea (campus annual festivals) and Power Point presentations in classes and club meetings; Articles in local newspapers (Advertiser and Star Bulletin), and interviews on public televisions.
Partnerships and Collaborative Ventures:

Research partnerships and mentorships have been established with researchers and faculty members from:

1. College of Tropical Agriculture and Human Resources (CTAHR) and College of Natural Sciences – Botany Department at UHM for course articulation, research mentoring and guest lecturing activities.
2. Department of Agriculture and Department of Biology at UHH for course articulation.
3. Hawaii Institute of Marine Biology (HIMB) for research mentoring.
4. Marine Option Program (MOP) for research mentoring.
5. Hawaii Agriculture Research Center (HARC) for research mentoring and on-the-job training.
6. Department of Pharmacy – University of Indonesia for collaborative research.
7. Biotech companies such as Pioneer Hi-Bred International, Inc.; Syngenta Seeds, Inc.; Mera Pharmaceutical Co.; Hamakua Mushroom Farm; Hoku International LLC; Diamond Head Plants; Kosaki Orchids; H & R Nursery; and Hawaiian Sunshine Nursery.
8. Grant partnerships are also established with:
   - BRIN (Biomedical Research Infrastructure Network)
   - EPSCoR (Experimental Program to Stimulate Competitive Research)
   - Harold K.L. Castle Foundation

Future Initiatives:

1. To expand partnerships with local, national and international biotech companies and educational institutions allowing faculty exchange, and more collaborative research and training opportunities.
2. To continue providing student internships for research/training in bioprocessing agribusiness in Hawaii and in mainland colleges and/or biotech companies.
3. To continue hiring guest lecturers/trainers to provide advanced biotech instructions.
4. To establish a plant medicinal garden equipped with aquaponic systems and a bioprocessing agribusiness facility.
5. To create a collaborative undergraduate scientific journal/newsletter with topics on biotechnology, bioprocessing agribusiness entrepreneurship, and other agriculture productivities.

Impacts:

The WCC Academic Subject Certificate in Bio-Resources and Technology with its two programs, Plant Biotechnology (PB), and Bio-Resource Development and Management (BRDM) has provided the community with knowledge and skills required to enter high paying jobs in biotechnology (a National workforce priority), and environmental monitoring.

The Plant Biotechnology Program prepares students to become bioprocessing agribusiness entrepreneurs – careers most needed in Hawaii’s diversified agriculture. The
program also equips students to further their studies to four-year institutions in agribiotechnology related fields including horticulture, aquaculture, and other biological sciences such as medicine and pharmacy.

In addition, research and training internships provide students hands-on training in bioprocessing agribusiness, water quality analysis and pharmaceutical research. Thus, stimulate more new students to enter both programs. Courses offered in PB and BRDM programs have attracted both science and non-science majors. More than 5,000 students have taken courses listed in these programs from Fall 2001 to Summer 2005.