WINDWARD COMMUNITY COLLEGE AUTHORIZATION TO PLAN (WCCATP)
AN ACADEMIC PROGRAM REQUIRING BOR APPROVAL

WINDWARD COMMUNITY COLLEGE

USDA United States Department of Agriculture
National Institute of Food and Agriculture

Certificate of Achievement in

Agripharmatech: Plant Biotechnology
and
Agripharmatech: Ethnopharmacognosy

Windward Community College – Department of Natural Sciences

New Program Proposal derived from the ASC Bio-Resources & Technology: Plant Biotechnology

Date of Proposal: January 2011

Proposed Date of Program Implementation: Fall 2011

1. Program Objectives, Relationship to Campus Mission and Strategic Plan

Plant biotechnology in the broadest sense deals with developing and improving plant production in order to supply the world's need for healthier (decreased use of pesticides) and more nutritious (higher vitamin and protein content) food crops, as well as biofuels, and plant-derived pharmaceuticals. The proposed Certificate of Achievement in Agripharmatech has two tracks: Plant Biotechnology, and Ethnopharmacognosy. The term 'Agripharmatech' is derived from 'Plant Biotechnology' and 'Ethnopharmacognosy'. The new CA is proposed to replace the existing Academic Subject Certificate in BioResources and Technology: Plant Biotechnology (ASC BRT-PB).

In 1998, after prompting from the United States Congress, the National Institute of General Medical Sciences (National Institute of Health) initiated funding for biotechnology training. Under this program, universities nationwide received funds to establish biotechnology training programs. University of Hawaii - Windward Community College has received Millennium Workforce Development Initiative (MWDI) grants to provide Plant Biotechnology – Tissue and Cell Culture Training Courses in Summer 2000 and 2001. The success of these training courses led to the establishment of the plant biotechnology program facilities, and to the offering of the ASC BRT-PB (see Appendix 1).

Four plant biotechnology program facilities (including equipment) consisting of the Tissue Culture and Plant Biotech Laboratory, the Bioprocessing Medicinal Garden Complex, the Climate-Controlled Greenhouse, and the Kuhi La'au – Tropical Plant and Orchid Identification Facility were developed and supported through grants from the USDA-NIFA*, USDA-SPEC*, HI-BRIN*, EPSCoR*, and PCATT* (see Appendix 2). The ASC BRT-PB has been offered and fully supported through grants from USDA-NIFA since 2002.

The Plant Biotechnology program has generated a total of forty-five ASC BRT-PB graduates (38% are Native Hawaiians). 42% of the graduates have entered the agribiotech workforce, 76% have transferred and received higher degrees, and 24 % have become agribioprocessing entrepreneurs (the total percentage exceeds 100% because different categories overlap. See Appendix 3).

The CA in Agripharmatech: Plant Biotechnology focuses on plant molecular genetics and its applications. See research posters on virus free transgenic clones and molecular phylogenetic studies in Appendix 4a. The CA in Agripharmatech: Ethnopharmacognosy focuses on plant pharmacognosy and its application. See research publications on Ethnopharmacognosy Series I and II in Appendix 4b.

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* USDA-NIFA (United States Department of Agriculture-National Institute of Food and Agriculture), USDA-SPEC (Secondary and Two-Year Postsecondary Agriculture Education Challenge), HI-BRIN (Hawaii-Biomedical Research Infrastructure Network), EPSCoR (Office of Experimental Program to Stimulate Competitive Research), and PCATT (Pacific Center for Advanced Technology Training)

Program objectives for both CA in Agripharmatech: Plant Biotechnology (CA A-PB), and CA in Agripharmatech: Ethnopharmacognosy (CA A-EP):

- Provide skillful workforce in plant biotechnology and bioproduct manufacturing through education, research/training
- Facilitate student transfer to higher degree institutions majoring in biosciences (plant/microbial biotechnology, plant molecular phylogenetic, bioinformatics, nutraceuticals, biomedical, ethnobotany, horticulture, and green pharmacy)
- Promote agribusiness-bioprocessing entrepreneurship

Windward Community College Mission Plan

Windward Community College is committed to excellence in the liberal arts and career development; we support and chanllenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community

The proposed Certificate of Achievement in Agripharmatech: Plant Biotechnology and the Certificate of Achievement in Agripharmatech: Ethnopharmacognosy support the following goals outlined in the **WCC Mission Statement and Strategic Plan**:

4.1 Contribute to the development of a highly skilled, high-wage workforce through the establishment of career-focused certificates that lead to employment in emerging fields
4.2 Establish partnerships with employers to create internships and job placement
4.3 Expand the curriculum to prepare students for critical workforce shortage areas
4.4 Create internships and service learning opportunities in the community
4.5 Promote the knowledge, skills, and opportunities that support current and emerging STEM fields and careers
4.6 Increase the number of transfers to the UH baccalaureate programs that lead to related occupations
4. 8 Increase the number of certificates awarded in STEM fields

2. Program Justification

According to the USDA - NASS (United States Department of Agriculture – National Agricultural Statistics Service) there are 2296 farms on Oahu; 250 of which are certified plant nurseries, including tissue culture labs (Anonymous, 2009a). Over 45 highly commercial biotechnology companies are operating in the Islands of Hawaii, and employ 1,700 Hawaii residents (Anonymous, 2009b). An O NET OnLine Summary Report for Agribiotechnology related occupations nationwide (including agribiotechnicians, microbiologists, bioprocessing, nutraceuticals, food pharmacy) in the United States projected a need of 41,000 additional employees by 2016 (Anonymous, 2009c).

Windward Community College already has a well–established Plant Biotechnology program, which offers an Academic Subject Certificate in BioResources & Technology: Plant Biotechnology, and has graduated an average of 6 – 7 students per year since 2003 (see Appendix 3). The graduates are trained in basic/applied

sciences and research including general botany, general microbiology, chemistry, cell and molecular biology, plant tissue culture, phytobiotechnology and ethnopharmacognosy. This knowledge/skill allows them to enter those occupations mentioned above. Biotechnology is listed as one of the emerging technical fields supported in the UH System's Program Change Request (PCR) #2.

Two certificates of achievement in Agripharmatech: the CA A-PB, and the CA A-EP are proposed (replacing the ASC BRT-PB) in order to broaden/focus more on specific fields, which will prepare students for immediate employment in the occupations mentioned above. The focus of the CA in Agripharmatech: Plant Biotechnology is on further study in plant molecular phylogenetic and genetic engineering. The focus of the CA in Agripharmatech: Ethnopharmacognosy is on further study of plant-based nutraceuticals and bioproduct manufacturing.

3. Description of Resources

In the present ASC BRT-PB, there is 1 Botany/Microbiology Professor as the Coordinator of the Plant Biotechnology Program (.6 FTE), 1 Botany lecturer (.6 FTE), and 1 Microbiology lecturer (.6 FTE). The program coordinator's assigned time, student research internships and items needed to operate the 4 plant biotech facilities have been supported through USDA-NIFA grants. Minor lab supplies and an undergraduate lab assistant have been funded through campus general funds.

An FB 11 – 13 Operating Budget Adjustment Request to the UH BOR for staffing & equipment for new CAs in Agripharmatech includes (Appendix 5):

1). A Plant Molecular Biology instructor ($55,344)
A request of 1 FTE Plant Molecular Biology Instructor to teach capstone classes such as BIOL 275/275L (Cell & Molecular Biology/Lab), BOT 210 (Phytobiotechnology), and BOT 299 (Plant molecular phylogenetic research) to fulfill the CA in Plant Biotechnology. These classes are transferable to UHM and other higher degree institutions, fulfilling biological requirements for Plant Biotechnology, General Biotechnology, Microbial Biotechnology, Molecular Biosciences and Bioengineering, Plant Molecular Phylogenetics, Biology and Pre-med.

2). A full time Lab Technician ($45,000)
Highly complex lab preparations and tremendous time consumed to prepare laboratory courses such as BIOL 275L, BOT 210, BOT 205 and MICRO 140. A lab technician with a molecular biology, chemistry, plant tissue culture and microbiology work experience/training background is needed to help prepare those lab courses.

3). A full time Garden Technician to maintain the Bioprocessing Medicinal Garden Complex (BMGC) ($35,000).
Currently the BMGC is maintained by a casual/overload hired Agriculture Technician (6 hours/week/8 months) and one student intern (3

hours/week/regular semester) paid through USDA-NIFA.The BMGC consists of 3 subfacilities (the medicinal garden, the aquaponic system, and the bioprocessing facility), which require maintenance by a special BMGC technician. The medicinal garden must be weeded (by hand), mulched, tilled, watered and replanted constantly to keep up with fast growing weeds, and to maintain healthy growth of plants in an organic growth environment. Medicinal and nutritious plants are studied by botany and agriculture students. Organically grown plants are also utilized in nutraceutical research for the BOT199/299 and BOT 205 lab practicum. The aquaponic system requires cleaning/maintenance. Lab equipment and the room in the bioprocessing facility needs to be serviced and maintained in working order.

4). Recruitment specialist
A recruitment specialist is necessary to recruit/introduce high school and freshman college students to CA programs and encourage them to take classes in the programs and to receive certificates. This program offers excellent career pathways, guaranteeing high paying jobs and transferable credits to higher institutions. Marketing tools including newspaper advertisements, TV, *Windward Malamalama, Ka 'Ohana*, websites, flyers, posters, PowerPoint presentations, special student activities and exhibits and class/school visitations are also part of the recruitment efforts that have to be integrated more actively and effectively.

5). Lab equipment: CO_2 anaerobic chamber, cellometer, RT-PCR, DNA profile imaging system, and DNA sequencher (total $150,000). $20,000 per year has been approved by the BOR for FY 12 – 17.

The Agripharmatech program will utilize the existing 4 plant biotech facilities (the Kuhi La'au – Tropical Plant and Orchid Identification Facility, the Tissue Culture & Plant Biotechnology Lab, the Climate-controlled Greenhouse, and the Bioprocessing Medicinal Garden Complex), and Hale Imiloa rooms 101 and 106.

4. Five-Year Business Plan

Developing the CA program with 2 tracks in particular will help Windward CC meet its outcomes for STEM degrees and certificates as well as total degrees and certificates to at least 186 per year by 2015. The college projects that within three years each of the CA tracks will have an annual enrollment of 11 students, with a total of 22 graduates annually. These programs concentrate on workforce development and student transfer to higher degrees, providing STEM education in targeted fields, which have high job placement.

The CA program (facilities and reassign time for the Program Coordinator will continue to be funded through USDA-NIFA grants. Lab supplies and the undergraduate lab assistant will continue to be funded by the college.

YEAR	FY 12	FY 13	FY 14	FY 15	FY 16
PROGRAM COSTS					
Faculty w/o fringe (Mol Biol instructor)	55,344	55,344	55,344	55,344	55,344
Other personnel w/o fringe (Lab Tech)	44,724	44,724	44,724	44,724	44,724
Library (Recruitment specialist)					
Equipment/Supplies	20,000	20,000	20,000	20,000	20,000
TOTAL Expenses	120,068	120,068	120,068	120,068	120,068

REVENUES	2 CA majors	Non majors**			
Projected Enrollment	22	909			
No. of Courses	14 - 16	49			
No. of Credits	48	133			
SSH	528	120,897			
Tuition Rate/Credit	$88	$88			
Total Revenue from Tuition	$46,464	$10,638,936			
Other Sources of Income	USDA/NIFA ($104,000)				
TOTAL Revenues	$150,464	$10,638,936			

** Non-program major students taking multidisciplinary classes listed in the two CA programs.

5. Impact on Current Courses or Programs

Courses that are already listed and offered in the ASC BRT-PB (26 credits) will be reselected and readjusted appropriately to emphasize major focus of each of the new CA (24 credits). This course adjustment will provide directed career/educational pathways with more in-depth knowledge/skills, and faster graduation, preparing students for immediate employment and seamless credit transfer to higher degree institutions. In addition, more than 800 students will benefit from taking classes listed in these CA tracks by gaining knowledge and credits toward their science requirements for AA in Lib Arts or AS in Science degrees. The list of courses for the CA A-PB and the CA A-EP are available in Appendix 6.

6. Evidence of Commitment/Support

The main courses, including capstone courses listed in the CA programs, are botany and microbiology courses that have been well developed and offered since 2002 by the ASC – PB Program Coordinator, who is a Professor of Botany and Microbiology and also a Co-Project Director of the USDA-NIFA Consortium grant. This individual will continue to be responsible for the two CA programs. The new programs are supported by WCC administrators; as well as the chemistry, agriculture, biology, and human nutrition faculty members of the Department of Natural Sciences at WCC. Student transfer and research collaboration across the UH system has been established with the Department of Molecular Biosciences and Bioengineering, the Department of Tropical Plant and Soil Sciences, the Botany Department, and the Department of Cell and Molecular Biology at UHM. This collaboration also exists

with the College of Agriculture, Forestry and Natural Resource Management at UHH. Research partnerships/internships have also been developed with biotech companies including the Hawaii Agriculture Research Center, the Pioneer Hi-Bred International Inc., Monsanto Inc. and many other plant nurseries/farms. See letters of support in Appendix 7.

7. Measure of Program Efficiency

Program efficiency will be measured using the following indicators. Goals for each indicator are listed in parenthesis:

- Number of students registering for the certificates (> 22)
- Course fill rate (100%)
- Number of core courses taught per year (> 12)
- Percent of students entering workforce (> 50%)
- Percent of students transferring to higher degrees (> 50%)
- Percent of students becoming bioprocessing entrepreneurs (> 20%)
- Number of students meeting certificate requirements within 18 months (> 10)

8. Measure of Program Effectiveness

Program effectiveness will be measured by the following indicators. Goals for each indicator are listed in parenthesis:

- Placement of certificate-holders into industry related positions (80% within 12 months of certificate completion) or
- Increase in mean wage for those already working in the field (mean wage > 20% within 12 months of program completion) or
- Performance and retention of certificate-holders in industry related fields or
- Satisfactory rating of certificate-holders, and employers with the quality of the program (> 80% satisfied with the program) or
- Transfer retention in higher degree institutions in program related field (> 50%)

Program outcomes will be measured by:

- Student evaluations
- Course completion rates
- Follow-up surveys of students and employers

9. References

Anonymous, 2009a. Certified Nurseries – Hawaii Department of Agriculture. http://hawaii.gov/hdoa/pi/pq/nema_cert/nurseries-in-hawaii

Anonymous, 2009b. Biotechnology in Hawaii: A Blueprint for Growth. http://www.iowabiotech.com/econ_dev_reports/Hawaiibiotech99.pdf

Anonymous, 2009c. Summary Report for Biological Technicians. http:// online.onetcenter.org/link/summary/19-4021.00

Appendix 1. Academic Subject Certificate in Plant Biotechnology

Bio-Resources & Technology

Academic Subject Certificate

Pursue careers in plant biotechnology, botany, horticulture, biology, pharmacy & medicine

University of Hawai'i®
Windward Community College

Plant Biotechnology

The Bio-Resources and Technology–Plant Biotechnology Academic Subject Certificate prepares students for careers in biotechnology and qualifies them to transfer to bachelor of science degree programs.

Knowledge in plant biotechnology will be an asset in bioproduct manufacturing, assuring safe food and medicinal production.

Plant biotechnology can lead to developing better food supplies, saving endangered plant species, fighting disease and strengthening strains of native plants.

Students have the rare opportunity to do hands-on research early in their college careers through WCC's Tissue Culture and Plant Biotechnology Lab, Plant and Orchid Identification Facillity, climate-controlled greenhouse and the Bioprocessing Medicinal Complex Garden.

Students can qualify for work as plant biotechnologists in this growing field or transfer to a bachelor of science degree program with majors in biotechnology, agriculture, horticulture, botany, aquaculture, pharmacy or pre-medicine.

This certificate consists of 26 credits. See course descriptions for prerequisites.

Required Courses (16 credits)

BOT 101	General Botany (4) **OR**
BIOL 171/171L	General Biology I and Lab (4)
BOT 160	Identification of Tropical Plants (3) **OR**
BOT 130	Plants in the Hawaiian Environment (4)
BOT 210	Phytobiotechnology (4) **OR**
BIOL 275/275L	Cell and Molecular Biology and Lab (4) **OR**
BOT 205	Ethnobotanical Pharmacognosy (3)
MICRO 130	General Microbiology (3)
MICRO 140	General Microbiology Lab (2)

Electives (10 credits)

AG 149	Plant Propagation (3)
AG 152	Orchid Culture (3)
BIOL 275	Cell and Molecular Biology (3)
BIOL 275L	Cell and Molecular Biology Laboratory (1)
BOT 105	Ethnobotany (3)
BOT 130	Plants in the Hawaiian Environment (4)
BOT 199/299	Independent Study or Summer Field Study Abroad (1-4)
BOT 205	Ethnobotanical Pharmacognosy (4)
CHEM 151 or CHEM 161	
CHEM 152 or CHEM 162	
CHEM 151L or CHEM 161L	
CHEM 152L or CHEM 162L	
FSHN 185	Human Nutrition (3)
GIS 150	Introduction to GIS/GPS (3)

For more information, contact Dr. Inge White at 808-236-9102 or ingelia@hawaii.edu.

Visit us at windward.hawaii.edu

Appendix 2. Plant biotechnology facilities and lab equipment

Tissue Culture and Plant Biotechnology Facility

Bioprocessing Medicinal Garden Complex

Climate-controlled greenhouse

Kuhi La'au – Tropical Plant and Orchid Identification Facility

Appendix 3. Academic Subject Certificate – Plant Biotechnology graduates, Fall 2010

Number	Name	4-Year Degrees	Occupations
1	Erin Yafuso	Received M.Sc MBBE - UHM	Workforce: WCC lecturer
2	Natallie Kong	Received MSc MBBE & Medical Doctor - UHM	
3	Anolani Badua	Received Doctor of Pharmacy-Loma Linda Univ.	Workforce: Pharmacy
4	Gregory Osterman	Received B.Sc Biology - UHH	Workforce
5	William Gray	Received M.D.	Entrepreneur
6	Brandon Pualoa		Entrepreneur
7	Marcia Diver		Entrepreneur
8	Jamie Iwamoto	Pursuing B.Sc Botany - UHM	Entrepreneur
9	Waiete Williams	Pursuing B.Sc TPSS - UHM	Entrepreneur
10	Tracy Peters	Pursuing B.Sc Biology - UHM	
11	Kristin Takaba	Pursuing B.Sc Bioinformatics - UHM	
12	Cheyne Somera		Entrepreneur
13	Shane Chambers	Pursuing B.Sc Forensic Science - Chaminade U.	
14	Pamela Gribbins		Workforce: Nursery Manager
15	Brian Freed	Pursuing B.Sc Horticulture - California	Workforce
16	Monica Young		Workforce: Syngenta Co.
17	Jessica Curry	Received B.Sc Microbial Biotech - UHM	Workforce: Pioneer HI-Bred Int.
18	Darin Chung	Pursuing B.Sc Nursing	Workforce: Nurse
19	Micole Sakaida	Pursuing B.Sc Dental Hygiene - UHM	
20	Kimberley Chinen	Received B.Sc Biology - UHM	Workforce
21	Cassandra Brandt		Workforce: School teacher, FL
22	Kimberly Ching	Pursuing B.Sc Botany - UHM	
23	Amber Tateno	Received B.Sc TPSS - UHM	Workforce: Research intern
24	Helen Shaudy	Received B.Sc Art & Education - UHM	Entrepreneur
25	Alisa Sheriff	Received B.Sc Biochemistry - HPU	
26	Brianne Christiansen	Pursuing B.Sc TPSS- UHM	Workforce
27	Kawaii Pali		Workforce: WCC
28	Payten Purdy		Entrepreneur
29	Barbara Davis	Received B.A. Accounting	Workforce: Nurse
30	Jaridan Choy	Pursuing B.Sc Ethnobotany & Nursing, UHM	
31	Justin Long	Pursuing B.Sc, TPSS, UHM	Workforce
32	Jamie Yee	Pursuing B.Sc. TPSS, UHM	
33	Javier Estrada	Pursuing B.Sc. MBBE, UHM	Entrepreneur
34	Jon Shimabukuro	Pursuing B.Sc. MBBE, UHM	Workforce: USDA – AG Inspector
35	Ikaika Dilliner	Pursuing B.Sc in Pharmacy, UHH	
36	Mark Rosskopf	Pursuing pre-med, UHM	Workforce: Kaiser Medical Center
37	Carmen Jimenez	Pursuing Horticulture, TPSS - UHM	Entrepreneur
38	John Murry	Pursuing Microbiology, MBBE - UHM	
39	Jeffrey Cortez	Pursuing Ethnobotany & Hawaiian Studies, UHM	
40	Michael Cervantez	Pursuing TPSS degree, UHM	
41	Kevin Mason	Pursuing biotech degree, San Diego	
42	Carrie Furtado		Workforce
43	Abby Kualapai		Workforce, entrepreneur
44	Nyan Stillwell	Pursuing TPSS, UHM	
45	Carden Vincent	Pursuing Biology, UHM	

Appendix 4a. Plant Biotechnology research posters

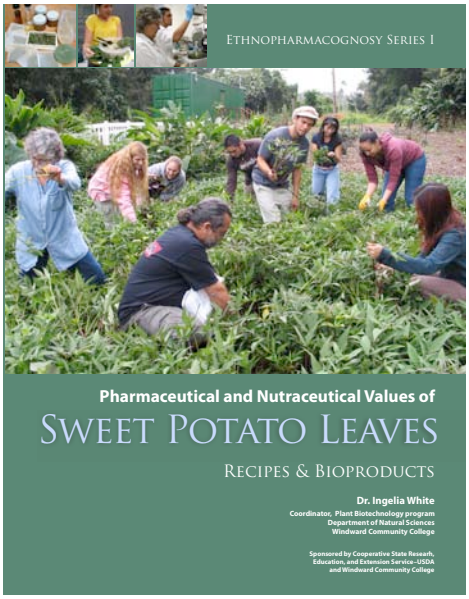
Morphological and DNA analysis of a wild-collected and a cultivated Epidendrum O'brienianum on Oahu, Hawaii: preliminary study

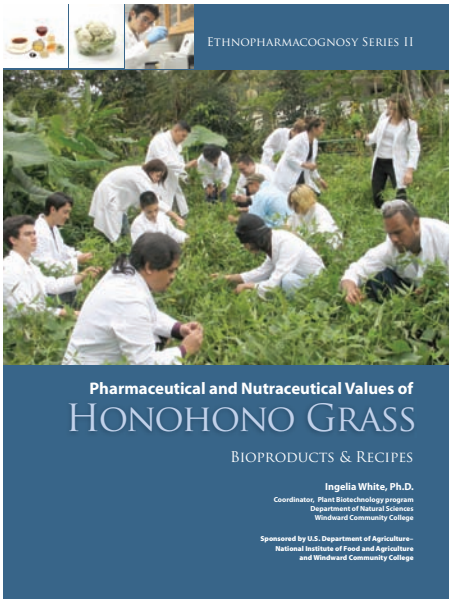
Ingelia White (*1), Kimberley Chinen (1), Clifford Nordeen (2)

Agrobacterium-Mediated Transformation of *Brassolaeliocattleya* Raye Holmes 'Mendenhall' Protocorm-Like Bodies to Confer Resistance to Cymbidium Mosaic Virus

Alisa Sheriff[1], Kimberley Chinen[1], Heather McCafferty[2], Yun J. Zhu[2], Fengyong Zhou[2], and Ingelia White[*1]

Appendix 4b. Ethnopharmacognosy research publications





Appendix 5. FB 11 -13 Operating budget adjustment request

FB 11-13 BUDGET
OPERATING BUDGET ADJUSTMENT REQUEST
UNIVERSITY OF HAWAII

FORM A

Date Prepared: **6/3/2010**

Program ID/Org. Code: Community Colleges - UOH 800/DD
Program Title: Windward Community College Instruction - UOH 331

Department Contact: Clifford Togo
Phone: 235-7403

Department Priority _____

Request Category:
Fixed Cost/Entitlement _____
Health, Safety, Court Mandates _____
Trade-Off/Transfer (+) (-) _____
Governor's Program Initiatives (+) (-) X
Recurring Costs _____
Other _____

I. TITLE OF REQUEST: **CA in Plant Biotechnology; CA in Ethnopharmacognosy; Certificate of Completion (CoC) in Plant-Food Production and Technology (70%)**

Description of Request:

II. OPERATING COST SUMMARY

	FY 12 Request			FY 13 Request			FY 14	FY 15	FY 16	FY 17
	FTE (P)	FTE (T)	($)	FTE (P)	FTE (T)	($)	($ thous)	($ thous)	($ thous)	($ thous)
A. Personal Services	2.00	0.00	100,068	2.00	0.00	100,068	100	100	100	100
B. Other Current Expenses			20,000			20,000	20	20	20	20
C. Equipment			0			0	0	0	0	0
L. Current Lease Payments			0			0	0	0	0	0
M. Motor Vehicles			0			0	0	0	0	0
TOTAL REQUEST	2.00	0.00	120,068	2.00	0.00	120,068	120	120	120	120
By MOF:										
A	2.00	-	120,068	2.00	-	120,068	120	120	120	120
B	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-
R										
S										
T										
U										
W	-	-	-	-	-	-	-	-	-	-
X										

III. OPERATING COST DETAILS

	FY 12 Request			FY 13 Request			FY 14	FY 15	FY 16	FY 17
MOF	FTE (P)	FTE (T)	($)	FTE (P)	FTE (T)	($)	($ thous)	($ thous)	($ thous)	($ thous)
A. Personal Services (List all positions)										
A Plant Molecular Biology Faculty (C2-5 (9 mo.)	1.00		55,344	1.00		55,344	55	55	55	55
A Lab Tech (APT), PBB-1 (11 mo.)	1.00		44,724	1.00		44,724	45	45	45	45
A										

		A							-	-	-	-
		A							-	-	-	-
		A							-	-	-	-
									-	-	-	-
									-	-	-	-
									-	-	-	-
	Subtotal Personal Service Costs		2.00	0.00	100,068	2.00	0.00	100,068	100	100	100	100
	By MOF	A	2.00	-	100,068	2.00	-	100,068	100	100	100	100
		B	-	-	-	-	-	-	-	-	-	-
		N	-	-	-	-	-	-	-	-	-	-
		W	-	-	-	-	-	-	-	-	-	-
B. Other Current Expenses (List by line item)												
Educational												
Supplies		A			20,000			20,000	20	20	20	20
		A							-	-	-	-
		A							-	-	-	-
		A							-	-	-	-
	Subtotal Other Current Expenses				20,000			20,000	20	20	20	20
	By MOF	A			20,000			20,000	20	20	20	20
		B			-			-	-	-	-	-
		N			-			-	-	-	-	-
		W			-			-	-	-	-	-
C. Equipment (List by line item)												
		A							-	-	-	-
		A							-	-	-	-
	Subtotal Equipment				0			0	0	0	0	0
	By MOF	A			-			-	-	-	-	-
		B			-			-	-	-	-	-
		N			-			-	-	-	-	-
		W			-			-	-	-	-	-
L. Current Lease Payments (Note each lease)												
		A							-	-	-	-
									-	-	-	-
	Subtotal Current Lease Payments				0			0	0	0	0	0
	By MOF	A			-			-	-	-	-	-
		B			-			-	-	-	-	-
		N			-			-	-	-	-	-
		W			-			-	-	-	-	-
M. Motor Vehicles (List Vehicles)												
									-	-	-	-
									-	-	-	-
	Subtotal Motor Vehicles				0			0	0	0	0	0
	By MOF	A			-			-	-	-	-	-
		B			-			-	-	-	-	-
		N			-			-	-	-	-	-
		W			-			-	-	-	-	-
	TOTAL REQUEST		2.00	0.00	120,068	2.00	0.00	120,068	120	120	120	120

Appendix 6. Course list for CA A-PB and CA A-EP

CA program with 2 tracks	CA Agripharmatech (24 credits)			
	Plant Biotechnology		Ethnopharmacognosy	
1 capstone class (4 credits)	BOT 210 or BIOL 275/L	Phytobiotechnology (4) Cell & Molecular Biology (4)	BIO 205	Ethnobotanical Pharmacognosy (4)
4 required classes (12 - 14 credits)	BOT 101 or BIOL 172/L AG 152 or BOT 130 MICRO 130 or BIOL 171/L MICRO 140	General Botany (4) General Biology II/L (4) Orchid Culture (3) Plants in the Hawaiian Env (4) General Microbiology (3) General Biology I/L (4) General Microbiology Lab (2)	CHEM 161/L or CHEM 151/L BOT 160 or BOT 101 or BIOL 172/L MICRO 130 or BIOL 171/L MICRO 140	General Chemistry I/L (4) Elem Survey of Chemistry/L (4) Identification of Tropical Plants (3) General Botany (4) General Biology II/L (4) General Microbiology (3) General Biology I/L (4) General Microbiology Lab (2)
2 - 3 elective classes (6 - 8 credits)	BOT 160 BOT 199/299 CHEM 199 AG 149 CHEM 161/L or CHEM 151/L CHEM 162/L or CHEM 152/L CHEM 272/L BIOL 275/L	Identification of Tropical Plants (3) Independent Study (1 - 4) (Directed Research for track 1) Independent Study (1 - 4) Plant Propagation (3) General Chemistry I/L (4) Elem Survey of Chemistry/L (4) General Chemistry II/L (4) Survey of Org/Bioorg Chemistry (4) Organic Chemistry/L (4) Cell & Molecular Biology (4)	BOT 105 BOT 199/299 CHEM 199 BOT 101 BOT 130 AG 152 CHEM 162/L or CHEM 152/L FSHN 185 BIOL 171/L	Ethnobotany (3) Independent Study (1 - 4) (Directed Research for track 2) Independent Study (1 - 4) General Botany (4) Plants in the Hawaiian Env (4) Orchid Culture (3) General Chemistry II/L (4) Survey of Org/Bioorg Chemistry (4) Human Nutrition (3) General Biology I/L (4)

Appendix 7. Letters of support

Cindy Goldstein, Ph D
Pioneer Hi-Bred International
Pioneer Waialua Parent Seed
PO Box 520
Waialua, HI 96791

January 11, 2010

To Whom It May Concern,

It is my pleasure to provide this letter of support on behalf of Pioneer Hi-Bred International as an industry partner affirming the importance of these proposed Windward Community College programs. Pioneer Hi-Bred sees great long-term value for Hawaii's seed industry, agriculture and technology sectors in development of the Plant Biotechnology program.

The seed industry is one of the few growth areas of our economy in Hawaii. Pioneer Hi-Bred International has expanded our operations and number of employees on Oahu and Kauai over the past decade and especially in the past 3 years. We have experienced difficulty in identifying and hiring employees with the educational background we seek for our positions and are very interested in having Windward Community College offer program that provides training to fulfill our demand for future job candidates in the area of agriculture science and plant biotechnology. Pioneer currently employees approximately 325 employees in Hawaii, with approximately 120 positions added in the past 3 years. We expect to recruit in the range of 40 to 50 full time employees in the next 3 years. Pioneer Hi-Bred is a committed industry partner that supports Windward Community College's goals and strategies. We feel that training a highly qualified, "home grown" workforce is key to developing a strong, sustainable economy in Hawai`i. To demonstrate our support, Pioneer Hi-Bred International is prepared to provide science-based presentations to students in classes offered as part of these programs as well as information and presentations about career opportunities and preparation for becoming well qualified job candidates. Pioneer is prepared to help place trained and qualified workers into our work force, especially students with an educational background in plant science, technology, and biotechnology.

We look forward to seeing course programs offered by Windward Community College and the opportunity to be involved as a community business partner and future employer of program graduates.

Sincerely,

Cindy Goldstein

Cindy Goldstein, Ph. D
Business and Community Outreach Manager
Pioneer Hi-Bred International, Inc

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January 29, 2008

Dear Dr. White:

This letter is to provide collaborative support for your continuing research project at Windward Community College (WCC).

I am a Research Scientist at Hawaii Agriculture Research Center (HARC) and my research interest at HARC is focused on the area of biochemical and molecular biology in tropical plant disease resistance and their interaction with microbes. Our lab is fully equipped to handle tissue culture, genetic transformation, pathogen isolation and culture, protein analysis, DNA/RNA isolation and characterization. My collaborations with Dr. White at WCC are: 1) to train and mentor students from WCC to learn new techniques, such as DNA/RNA isolation and characterization; 2) to develop tissue culture and genetic transformation system for orchids; 3) to evaluate the presence and expression of transgene transformed in the plant; 4) to develop bioassay for evaluation of transgenic orchid plants for virus resistance; and 5) to prepare the presentation of research findings in poster and/or paper for publication.

In the past few years, the collaboration between HARC and WCC has generated tremendous impact in several students from WCC in terms of their learning modern biotechnology, finding employment, and advancing to institutes offering high degrees. The following is the list of ASC in Plant Biotechnology graduates from WCC who have been trained in a number of research projects through this collaboration and have been employed by HARC:

1. Natalie Kong: Worked on project entitled 'Transgenic orchids', Fall 2002 (she has received M.Sc in MBBE from UHM, and now she is a junior at School of Medicine, UHM).
2. Greg Osterman: 2003. Biology major at UHH and worked for HARC and USDA ARS as a biology technician.
3. Erin Yafuso: 2003. She has received B.Sc in MBBE and worked at HARC. Now is a graduate student in Horticulture at UHM.
4. Waiete Williams: Researched in 'Transgenic Orchids via Gene Bombardment', 2003-2004, and worked at HARC.
5. Anolani Badua: 2004-2005. Researched on 'CyMV Resistant Gene Transformation in Orchids via Agrobaterium tumefacience'. She has received B.Sc in Biology and B.Sc. in Pre-med from HPU. Currently, she is in School of Pharmacy at Loma Linda University, San Diego.
6. Tracy Peters: 2004-2005. She is pursuing a B.Sc in Biology at UHM.
7. Kimberley Chinen: Researched on 'Agrobacterium-mediated Transformation of Blc. Raye Holmes Mendenhall Protocorm-Like Bodies to Confer Resistance to Orchid Cymbidium Mosaic Virus'. 2006 - 2007. She will receive a B.Sc in MBBE in Fall, 2008.

Sincerely,

Y. Judy Zhu, Ph. D.
Plant Biochemist, Project Leader

University of Hawai'i

WINDWARD COMMUNITY COLLEGE

January 11, 2010

To whom it may concern,

The Instructional Division at Windward Community College is very much in support of Dr. Ingelia White's proposal, *University of Hawaii Agribusiness Education, Training and Incubator Project (AETI).*

Dr. White continues to do outstanding work in developing the Plant Biotechnology Program at Windward Community College. In July of 2007 the Bio-processing Medicinal Garden Complex became operational as part of the facilities supporting the Academic Subject Certificate in Bio-resources and Technology: Plant Biotechnology. Funding for this can be attributed in large part to the USDA Consortium. Dr. White has also followed up with her students who complete the certificate and can document that they all have either found gainful employment or gone to seek higher education in the field.

The main focus of the USDA consortium project Fiscal Year 2010-2011 is to produce a highly trained and skilled workforce in agripharmacobiotechnology for Native Hawaiian students and other minorities, and to promote a healthier diet and make Hawaii more self-sufficient in food production, as is stated on section # 4 (Justification) of the WCC Fiscal Year 2010 grant proposal. The other ongoing focus is to improve student enrollment and retention by engaging high school students with Windward students in collaborative projects that involve the cultivation of medicinal and nutritious plants, analyzing their medicinal properties and using the plants to make biopharmaceutical products. Specific community outreach efforts are taken to ensure notice of and interest in these courses.

This proposal continues to be a timely and worthy project. And, without any hesitation whatsoever, we continue to fully support the work of Dr. Ingelia White, and this proposal.

Sincerely,

Margaret Coberly

Margaret Coberly, PhD

Interim Dean of Instruction

Richard Fulton

Richard Fulton, PhD

Vice-Chancellor

45-720 Kea'ahala Road, Kāne'ohe, Hawai'i 96744-3528
Telephone: (808) 235-7400
An Equal Opportunity/Affirmative Action Institution

Reviewed by: (*The ATP has completed the campus approval process prior to review by Council of Chief Academic Officers*)

Campus Chief Academic Officer:
Comments and Recommendations:

_____ _____
Print Name Signature Date

Council of Chief Academic Officers (Systemwide Consultation):
Comments/Recommendations:

_____ _____
Print Name Signature Date

Chancellor: __ Approved __ Disapproved

_____ _____
Print Name Signature Date

(*Final signed copy is provided to the Vice President of Academic Planning and Policy for Program Action Report)*