

Early College Certificate Program at Kailua and Castle High Schools

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Windward C C's Early College High School Agripharmatech Program

- Allowing high school students to earn nine college credits before they graduate from high school
- Providing early college agriculture and botany courses over three semesters
- Receiving Agripharmatech Certificate of Competence in Plant-Food Production and Technology, and a high school diploma
- Preparing for their future degree/career

Plant-Food Production and Technology

Certificate of Competence



The field of plant-food technology offers numerous career options. Besides employing people for research and development, the industry also covers to various other agricultural biotech-related fields including high-tech farming, in vitro and in vivo plant propagation, food processing, and post-harvest technology. Occupations related to agricultural plant-microbiotechnology are expected to increase 10%-12% by 2018 (DIA Research and Statistics Office, 2014). The average professional growth for Precision Agricultural Technicians from 2012 to 2022 is from 8% to 14%, with employment of 64,000 employees and a median annual salary of \$3,130 in 2012 (O-NET On-Line Summary Report, 2011).

In order to attract a new generation of skilled agricultural-food technicians, Windward Community College offers a Certificate of Competence in Plant-Food Production and Technology (CO PFPaT). The CO PFPaT serves as a leading pathway certificate toward the Certificate of Achievement (CA) in Agripharmatech and/or Certificate of Competence (CC) in Agriculture Technology, as well as prepares students for immediate employment.

CO PFPaT is a credit certification program requiring a total of 9 credits. Select three of the following classes:

- BOT 102 (Ethnobotany, 3 credits) ac
- BOT 150 (Plant in Hawaiian Environment, 4 credits) ac
- BOT 180 (Identification of Tropical Plants, 3 credits) ac
- BOT 198 (Independent Study, 2-3 credits) ac
- AG 120 (Plant Science, 2 credits) ac
- AG 140 (Plant Propagation, 3 credits) ac
- AG 152 (Orchid Culture, 3 credits) ac
- FSNR 103 (Plant Nutrition, 3 credits)

Students will be trained in plant identification, in vitro and in vivo plant propagation, plant growth and culture, medicinal/traditional uses of plants, as well as practical training in the lab, medicinal garden and greenhouse. The CO graduates will participate in mentoring programs where they work in local companies to gain experience before entering the workforce.

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Agripharmatech

Certificate of Achievement

Ethnopharmacognosy & Plant Biotechnology



There are 2,296 agriculture farms on O'ahu, 250 of which are certified plant/orchid growers, including those citrus labs. In addition, over 43 large biotechnology companies are operating in Hawai'i, providing 1,780 jobs. Plant biotechnology businesses offer higher wages and benefits to their highly skilled employees. Plant biotech/ nutraceutical-related jobs project a total of 41,000 additional employees by 2016 nationwide. The market for herb and herbal product sales in the U.S. reached a peak in 1998 of \$700 billion. Nutraceutical product enterprises could provide a positive impact on our state economy.

To ensure Hawai'i is a participant in this advanced science and technology, starting in Fall 2012, Windward Community College offers a Certificate of Achievement in Agripharmatech with two specializations (Ethnopharmacognosy and Plant Biotechnology). This Agripharmatech program will create a highly skilled workforce for the many organic plant-based product labs and plant biotech businesses throughout our islands.

Agripharmatech Program Objectives

- Provide a skilled workforce in plant biotechnology and plant-based products manufacturing through education, research/training
- Facilitate student transition to higher degree institutions specializing in biotechnology (plant/microbial biotechnology, plant molecular phylogenetics, bioinformatics, ethnobotany, horticulture, nutraceutical, biomedical, and green pharmacy)
- Promote agribusiness-biotechnology entrepreneurship

Workforce in Ethnopharmacognosy Specialization

Students will secure jobs as plant-based product technicians, pharmacognosy research technicians, nutraceutical specialists, plant biology teachers, plant nursery managers, organic farmers, ethnobotanists, food product managers/inspectors, and dietitians/nutrition-related specialists.

Workforce in Plant Biotechnology Specialization

Students will secure jobs as plant biotechnicians, microbial biotechnicians, tissue culturists, analysis researchers in plant biological sciences, orchid molecular phylogenetic technicians, orchid hybridizers, plant nursery managers, plant conservationists, horticulturalists, and agricultural inspectors.

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The Certificate of Competence in Plant-Food Production and Technology (CO PFPaT), 9 credits pathway certificate toward the Certificate of Achievement (CA) in Agripharmatech (30 – 31 credits)

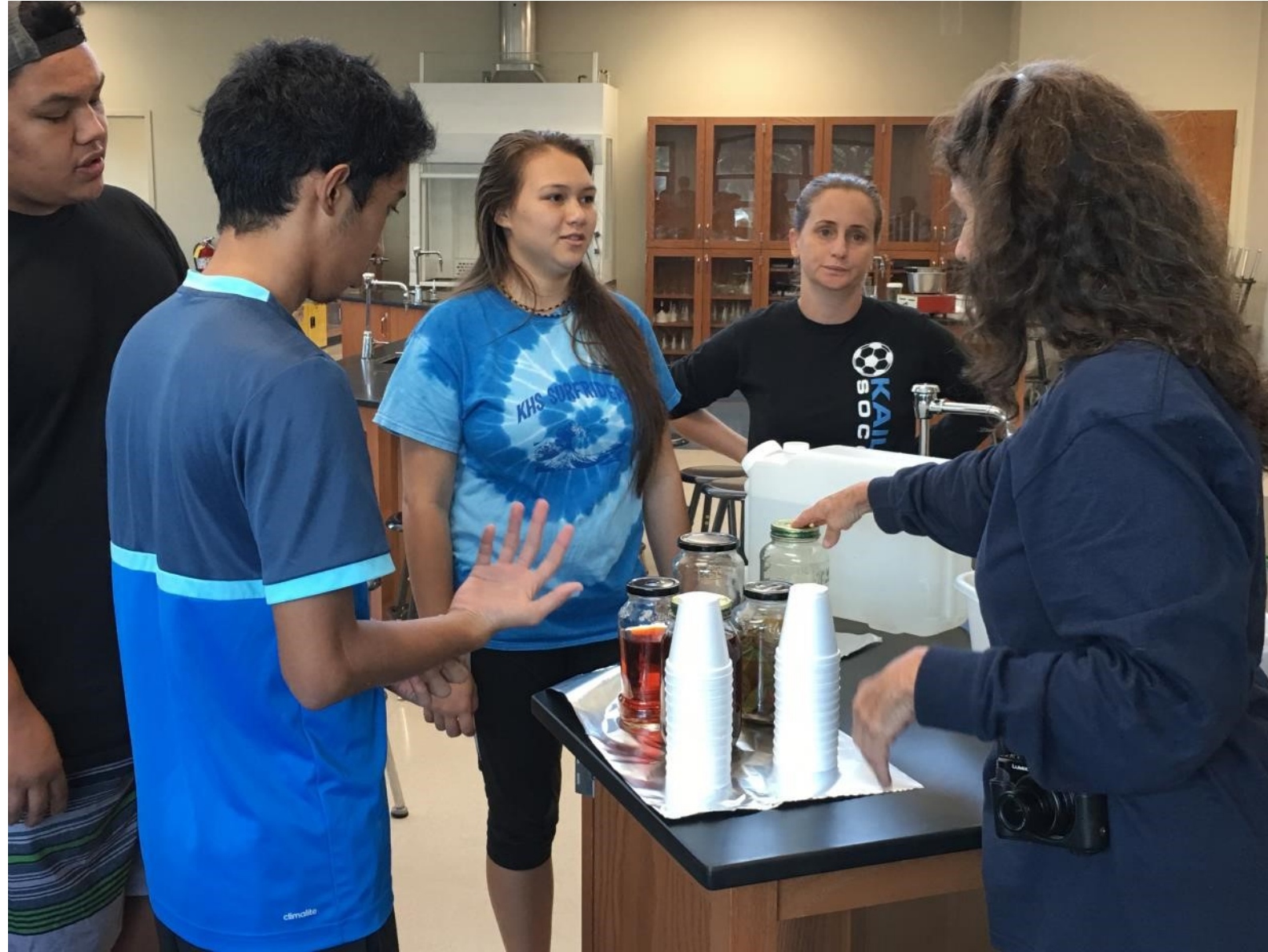
Kailua High School



BOT 160 Identification of Tropical Plants

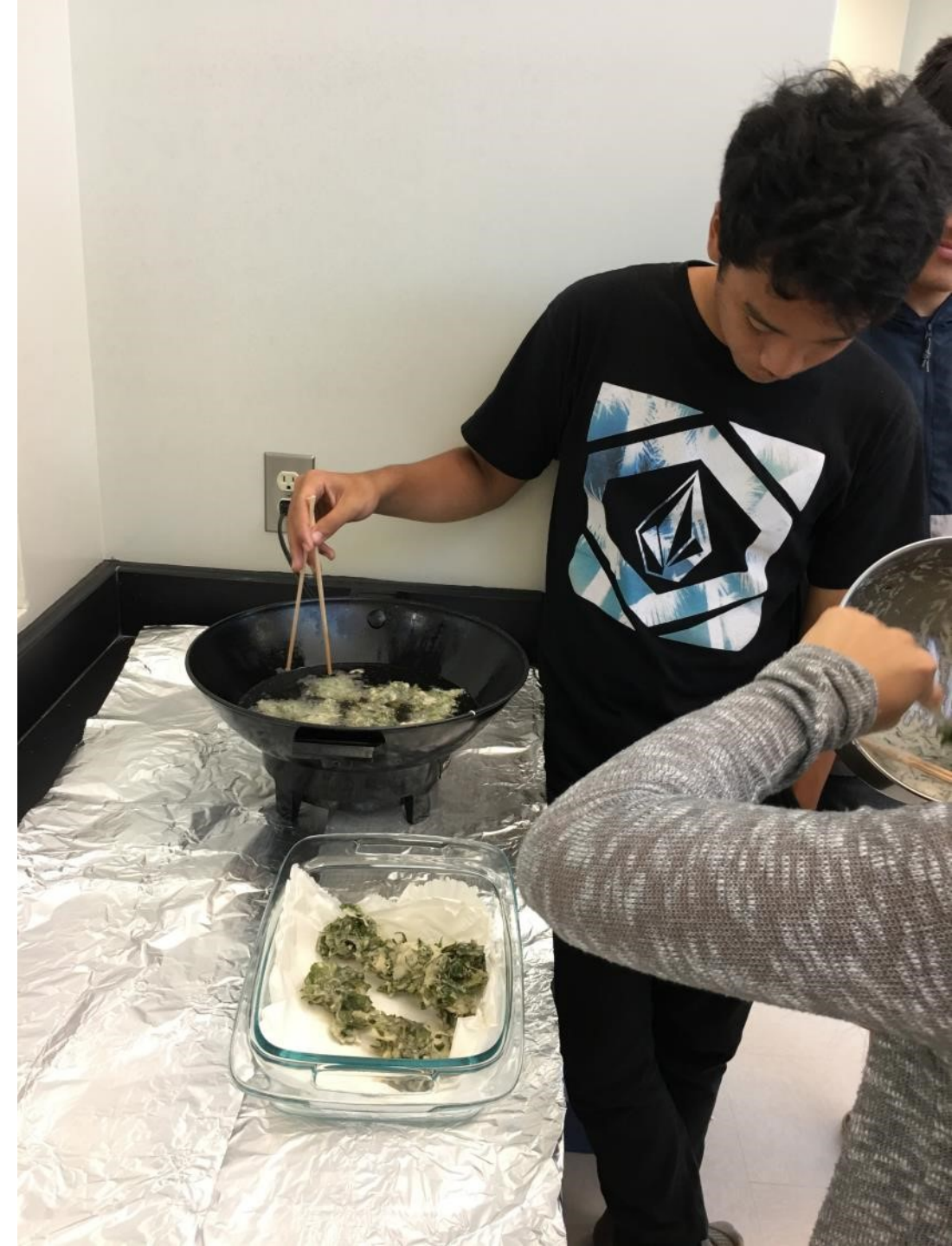


BOT 105 Ethnobotany



BOT 199 Independent Study

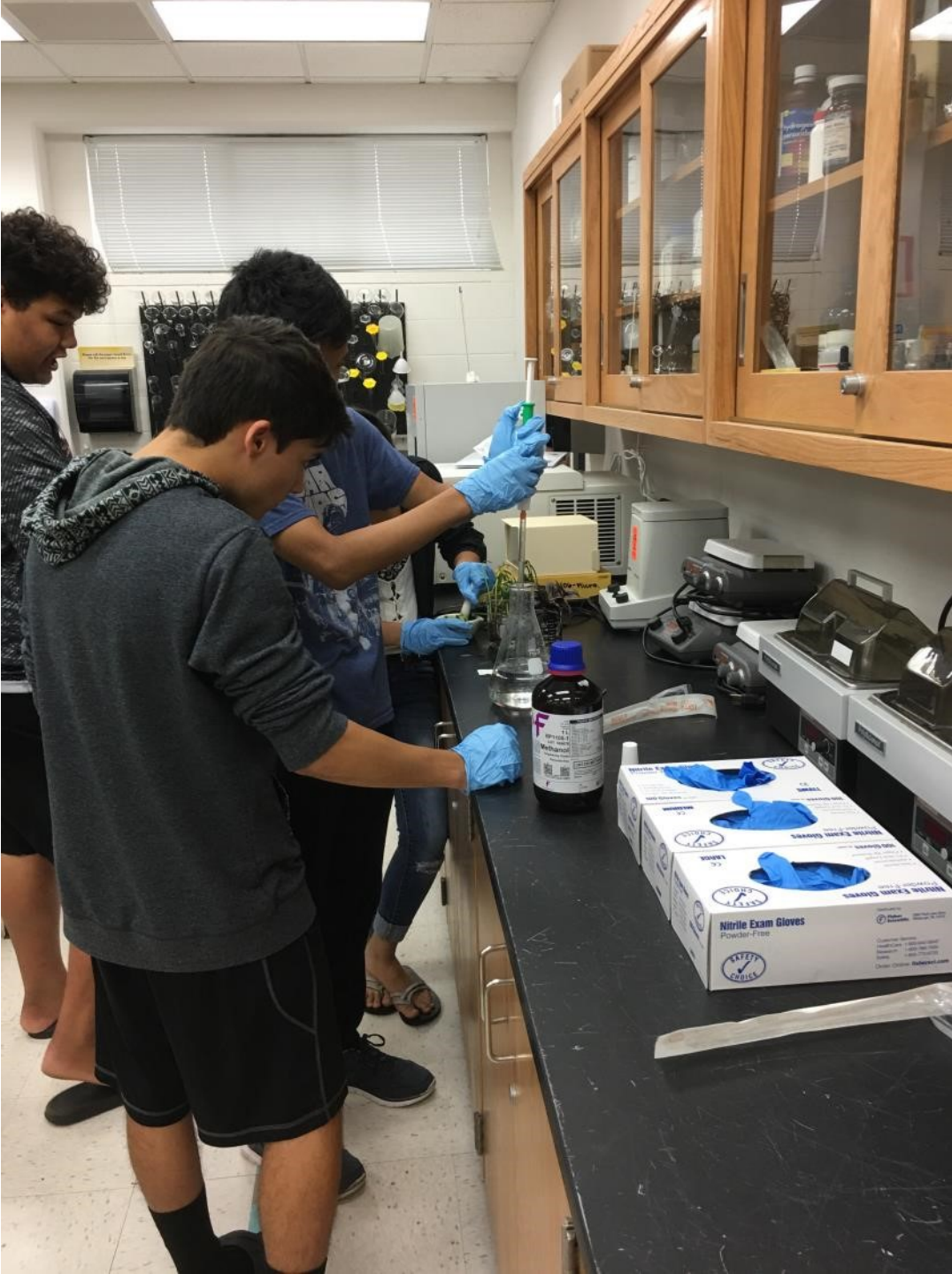
Preparing Food Pharmacy



Preparing Nutraceutical Products



Analyzing Antimicrobial Properties



Ethnopharmacognosy

The use of plants as pharmaceuticals

Krestian Gosiaco, Kaila-Ann Kaonohi, Nandini Bickel, Pomai Kekua, Joleen Tangonan, and Noah Chun

Kailua High School

BOT 199 Independent Study, Agripharmatech Program, Windward Community College

Ethnomedicine

Study or comparison of the traditional medicine practiced by various ethnic groups, and especially by indigenous peoples.

Ethnopharmacognosy

The study of substances that are derived from natural sources and used medicinally (especially folk remedies) by different ethnic or cultural groups.

- Traditional medicine and medicinal plants are frequently used in urban settings as alternatives in daily health care and self-medication against minor and chronic ailments but especially relied upon in less wealthy rural areas or times of economic crises.
- The focus of ethnopharmacology centers on the bio-cultural investigation and description of "traditional," indigenous or local pharmacopoeias and the experimental evaluation of *materia medica* through biological test systems.
- The global commercialization of herbal medicine and the emergence of what is called Complementary and Alternative Medicine as a social phenomenon during the past decades is also due to the perception among Western societies, that the consumption of such products would be devoid of health risks, especially in comparison to pharmaceuticals.

How has it been used to treat diseases?

- Garlic: Toxic to at least 14 kinds of cancer cells (including brain, lung, breast, gastric, pancreatic).
- Lavender: Treats acne, psoriasis, eczema, and wrinkles.
- Ginger: Fights cancer, diabetes, asthma, and bacterial infections.



How does it relate/evolve culture?

- In relation of ethnopharmacognosy, cultures, ethnicity, and race differentiate the methods they use in response to making medications for those who need it.
- Leininger (1995) suggests that culture is learned values, beliefs and patterned lifeways to facilitate or enable to improve people's conditions and life ways and deal with illness, handicap or death.
- This is why ethnopharmacognosy is so important for different cultures because some cultures are very poor to have the same materials. So they find other relative ways to make the same medicine, this is how ethnopharmacognosy evolves. Africa is a good example for showing ethnopharmacognosy because they may not have the same materials as other countries but based on their culture, they use different materials so that they can get the a good enough result for the medicine.

How do people use this around the world?

Everyone around the world uses plants as medicine.

- Hawaii: The kukui nut oil moisturizes and hydrates the skin. It treats damaged skin, eczema, and psoriasis. The toxic effect on certain bacteria, fungi, and viruses are due to the antimicrobial properties that fight infections and speed recoveries. The noni can be used in various ways. Eating the Noni helps coughs, diabetes, and nausea. Drinking the juice of the Noni is used for arthritis, diabetes, and high blood pressure. The leaves help stomach ache and swelling of joints.
- China: The root of Panax Ginseng is used to make medicine. The active ingredients found in this herbal plant treats breast cancer, prevent lung cancer, skin cancer, and liver cancer. Astragalus also uses its root for medication. This plant is known for its medication Huang Qi. Huang Qi fights off colds, flus, and respiratory problems. Astragalus is also used for heart disease remedies, therapy for cancer, and treats arthritis, asthma, and low blood sugar levels and blood pressure.



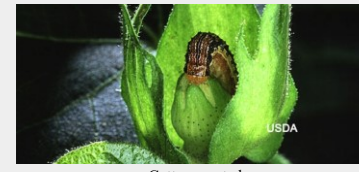
Golden Rice modified to provide Vitamin A in rice

Plant Biotechnology

Zach Marrotte, Elias Wong, Oli Palenapa
Gabe Le Lesch, Sarah Costa, Brysen Pedrina

Kailua High School

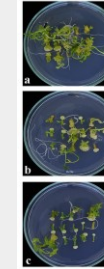
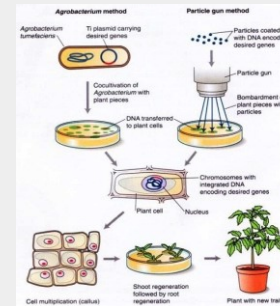
BOT 199 Independent Study
Agripharmatech Program, Windward Community College



Cotton created to be insect resistant

What is Plant Biotechnology?

Scientific technique that adapts plants for specific purposes by cross-breeding, extending their growing seasons, adjusting height, color and texture and several other mechanisms. Classical or traditional is creation of hybrids and human selected breeding. Modern is genetic engineering, plants are changed all the way down to their genes.



The process of modifying certain plants at the cellular levels.



Papayas genetically modified to fight virus detrimental to the papaya

Micropropagation allows for a whole plant to be made using very small parts of a parent plant.

How is Plant Biotechnology Used?

- Creating reliable and sustainable food sources for populations around the world
- Scientific and medical research, and find ways to make crops resistant to droughts, diseases and other maladies
- Plants use soil nutrients more efficiently, boosting productivity in areas of the world with inadequate rainfall or poor soil



Herbicide resistant crops tested. Result shows dead grass while the genetically modified crop survives

Genetically Modified Plants in Hawaii

- The main companies working with genetically modified crops in Hawaii are Monsanto, Syngenta, Pioneer Hi-Bred, BASF, Mycogen Seeds and Agri Genetics
- In 2008 Some 4,800 acres were dedicated to GM crops across the state,
 - 3,500 were corn and soybean seed crops
 - 1,000 acres papaya
 - The remainder field trials for GM crops

How does plant biotechnology affect our culture?

- In the field of reproduction new biotechniques such as embryo transfers in vitro fertilization, cloning and sex determination of embryos have been developed for different types of livestock.
- Plant breeding has been enhanced considerably by in vitro development of improved varieties which are better adapted to certain environments
- Plant biotechnology has also reduced the use of agrochemicals.



Ginseng



Quinine and morphine



Artemisinin



Nabilone

2500 B.C.

18th century

20th century

2006

Ginseng	2500 BCE	Known for its aphrodisiac qualities. Great health benefits and healing properties.
Quinine and Morphine	18th century	Treats moderate pain. Usually found from Poppy plants.
Artemisinin	20th century	Semi synthetic derivatives. Used against plasmodium falciparum malaria
Nabilone	2006	Man- made form of cannabis. Used to treat sever nausea and vommiting caused by cancer chemotherapy.





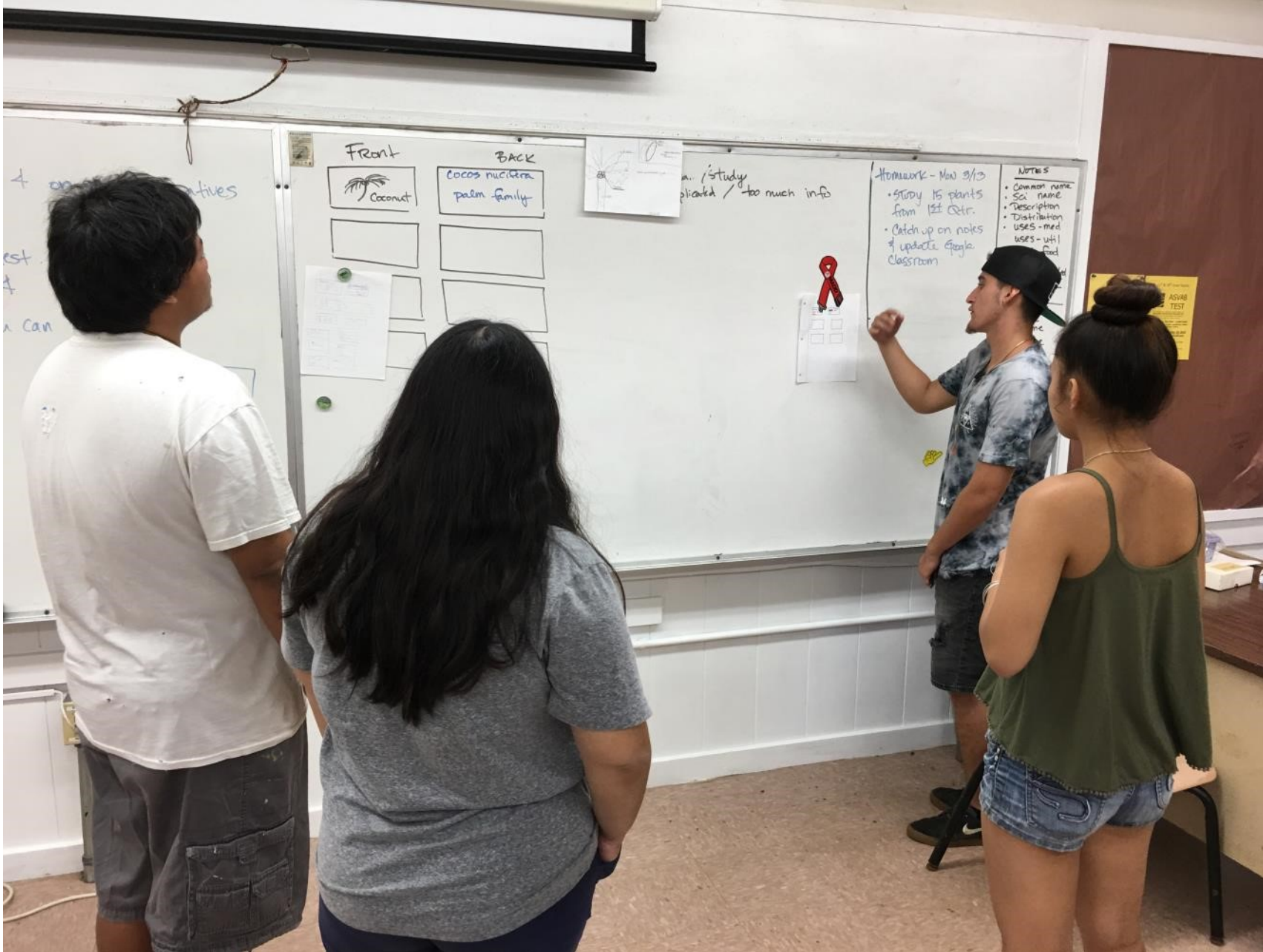
92% of EC KHS students received CO PFPaT

Castle High School



BOT 105 Ethnobotany





Study group – learning botanical terminology with flash cards

Preparing Laulau (steamed-wrapped *Colocasia esculenta*)

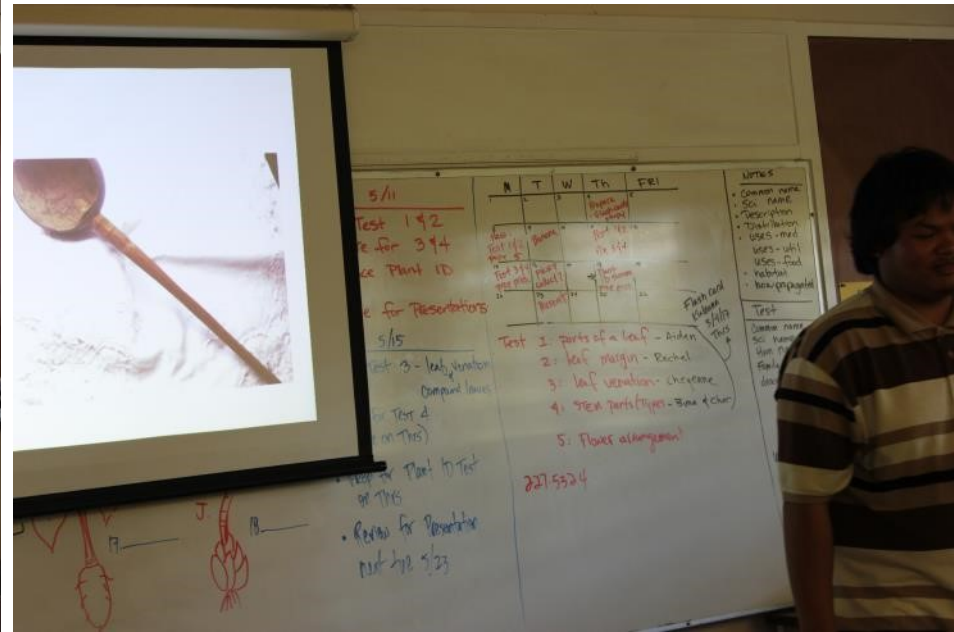
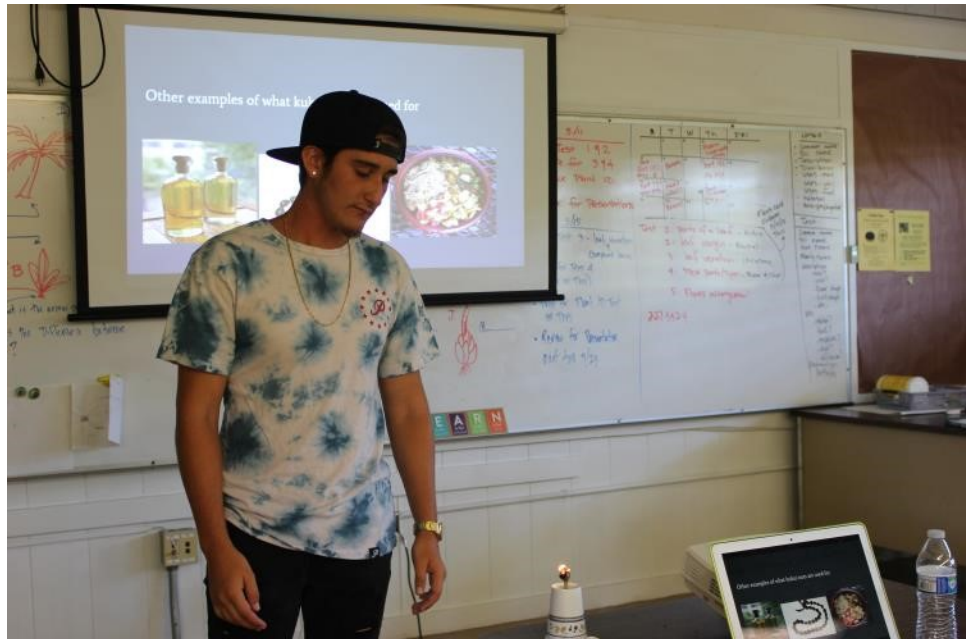


BOT 199 Independent Study

Propagating and Planting Polynesian Plants



BOT 199 Student Presentations



AG 152 Orchid Culture





100% of the EC CHS students will receive CO PFPaT in Fall 2017

Acknowledgement

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