Agriculture and Natural Resources

2020
ANNUAL REVIEW OF PROGRAM DATA

UNIVERSITY of HAWAI'I®
MAUI COLLEGE

1. Program or Unit Description

a) **Program Mission:** We envision a program that promotes active student engagement by providing high quality instruction in agriculture, horticulture, and natural resource management with an emphasis on entrepreneurship and sustainability

b) **Description:** The Agriculture and Natural Resources program has three areas of emphasis each with degrees and/or certificates: *Sustainable Tropical Crop Management* (CO, CA, AAS) which focuses on production and entrepreneurship. The program has partnered with GoFarm Hawaii to deliver new farmer training using the STCM CO; *Horticulture and Landscape Maintenance* (CO,CA,AAS) which covers careers in the green industry; and *Natural Resource Management* (CO,ATS) to prepare for jobs in resource management.

c) **Target population:** The program has several target populations. The first is the non-traditional older adult who is looking for a career change or upgrade. These students are at least 4 years past high school and are very diverse in educational backgrounds but are generally motivated to learn and have goals. The second target audience is recent High School graduates. The program spends considerable time going out to High Schools, having K-12 students visit and doing various workshops with K-12 to promote awareness of Agriculture as a potential career. A third group are professionals in the field who come for specialized training, for instance taking a class on insects or irrigation, who are not degree seeking. We also have some Liberal Arts majors who take a class or two as natural science electives.

2. Analysis of the Program/Unit

ARPD tables are located at the end of this section. In the Demand area, Agriculture has maintained a high number of job openings in the State. Majors have been declining over the past three years which unfortunately is a common trend when the economy is good. Students and potential students in farming, landscape and resource management can often get labor jobs and stay employed rather than get schooling to move up or improve. Most of our students are non-traditional and work while going to school so when their employer is busy, they often find it hard to take off and go to class. Note the majority of students are part-time. We have been successful working with GoFarm Hawaii to get adults to do the sustainable crop production classes by breaking up the 8 hour/week course into 2 evening hours and 6 hours on Saturdays. This allowed folks who are working, but want to start farming, to be able to come to those classes. We always offer night courses (3.5 hours once per week with some Saturday labs) that allows working people to come to class. Note we also service a considerable number of non-majors. Our biggest issue is attracting new students into the program. We do outreach to the high schools. I believe our web and social media outreach and promotion needs to be better. This is where the program could use very directed help.

Efficiency is cautionary and the lower number of majors leads to fewer students. However, the low enrolled course number is a little misleading. This is because we have several courses that have class size limits (just like nursing clinicals). Our tractor class has a 5-person limit. We had two sections and allowed extra students in the class but those courses would automatically be “low

enrolled". We also have beekeeping which has a 10-person limit, so often a student might drop after first week and we end up with 9. Nevertheless, we did have too many low-enrolled courses this past year. We returned AG 200 to WI. This attracts non-majors who can use the class for natural science elective as well as a WI credit. This has helped enrollment in Fall 20. The program is down to one FTE faculty – faculty position on Molokai has been lost but this has "improved" efficiency numbers.

Effectiveness is also cautionary. Our completion and persistence numbers are steady and I think fairly reasonable. We do always have some students who find out AG is not for them – either because they find it is not a good fit for them or they find out it is more academically challenging than expected (AG is a biological science), or life happens and the time required is too much. Note our Fall to Fall persistence has dropped. This could be explained by our increase in GoFarm Hawaii students who take the equivalent of the Sustainable Crop CO. We set up the courses they take so it is accessible for working students to complete in Fall and Spring semester. Many of the "GoFarmers" are just here to complete that set of coursework and do not intend to continue past that year.

The graphic above shows the graduate numbers go up and down on a cycle. We do need more graduates and we have several students currently finishing up. With part time students and many classes offered on a two-year cycle, it can be hard for students to finish and we tend to have this

cyclic graduate pattern. The biggest concern currently is getting students into the program. The drop in enrollment in the past three years will have a continuing negative affect on graduation rates for a period of time. The GoFarm cohorts that come only for the CO also will not show up in the CA/AAS numbers.

Transfers to 4-year did go up. We do articulate to some degree with UHH and we do have an online pathway with Oregon State eCampus. Because of the difficulty with articulation with 4 year programs, (short story – our 100-200 classes are generally equivalent to 300-400 at 4-year program classes so those Bachelor programs will not directly accept many AG courses and they have limited 100-200 level electives) most younger students that indicate they wish to pursue a B.S., are counseled to move from our program and get their pre-requisite science courses done here at UHMC and then transfer. Most of our students do not intend to transfer but want to get a job or start a business and want the information and skills they need to be effective in the workforce. So, this is what we try very hard to deliver.

The AGNR program met all Perkins indicators except 2P1 completion. That relates to students stopping out before getting a certificate or degree. There is a significant number of students in GoFarm Hawaii who do not earn the CO. This is because we run via GoFarm an introductory summer non-credit short course that is similar to AG 103. This summer course has helped us recruit this cohort of students into the AG program. If the students do this summer course, AG 103 is waived as a co-requisite for AG 251. The students take all the course except 103 but then they finish without getting the CO. (CO = AG 103, AG 104, AG 251, AG 252, AG 232) A few other students who do not complete come from those we counsel out as mentioned above, professionals in the field that come to take a few courses, and of course students who decide for various reasons listed earlier that drop out of the AGNR program.

The AGNR program tries to provide students with practical skills and the scientific knowledge that will help them with their careers. "Agriculture" is a broad-based career path. The program focus is horticulture but we cover business, pests, irrigation and many other topic areas. The credit courses allow in depth training in these various disciplines that students will need to be productive.

Here are a few comments from graduates of our programs from a survey monkey sent on November 9, 2020:

"My education at UHMC AG department was instrumental in my development from a novice landscaper to a professional landscape contractor. I would not have been nearly as successful growing my business and earning the respect and solid reputation without the knowledge I obtained from Ann Emmsley and her colleagues. Specific knowledge that has been especially helpful was the understanding of issues localized to Maui's landscapes and agriculture. Much of this knowledge is crucial in stopping the spread of invasive pests and diseases as well as preserving the native flora and fauna. In my opinion, the AG department is vital to not only our local community but the economy as well and it should be promoted as resourceful prize on our island."

"I have had greater job opportunities, because of the Agriculture Degree that I carry. I have started my own farming, on my own land, using and combining methods that I learned by being in the

UHMC Ag program. There is no doubt that if I can grow vegetable crops under the harshest growing conditions that can possibly be found on Maui, then anyone can learn and employ what is being taught at UHMC Ag Department."

"I was able to get hired at the National Park Service which has influenced my work and personal life positively. I am connected to a larger (locally, state, and nationally) audience in teaching others about natural and cultural resources of Hawai'i. And I enjoy my work. It has allowed me to reach personal life goals!! Please continue this avenue of education for others."

"AGNR program has taught me skills which have made my farm more efficient. It has also boosted my confidence in growing plants and dealing with problems which may arise in my line of work."

"The knowledge has allowed me to contribute positively to my job in agriculture. The contacts I made as a student helped me to get my job here on island."

Lastly under performance indicators, I would note that agriculture is a STEM field despite what that chart states. Agriculture is an applied biological science. And like other science majors, the program is academically rigorous. Many of our effectiveness indicators are similar to the ASNS program.

Charts on indicators are below:


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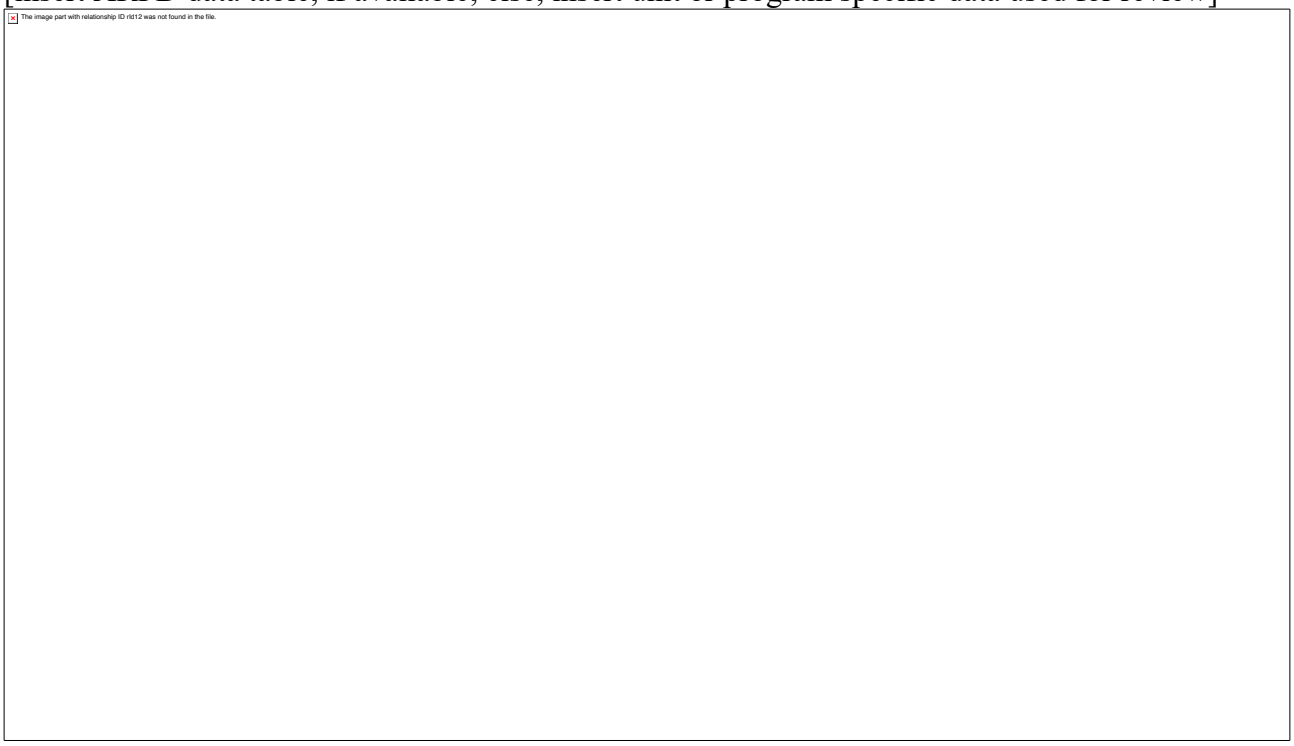
[insert ARPD data table, if available; else, insert unit or program specific data used for review]



https://uhcc.hawaii.edu/varpd/index.php?y=2020&c=MAU&t=CTE&p=2223

3. Program Student Learning Outcomes or Unit/Service Outcomes

a) List of the Program Student Learning Outcomes or Unit/Service Outcomes

PLO 1. - Use basic business principles to manage projects or design a horticultural business enterprise.

PLO 2. - Recommend cultural practices, solve problems, plan projects, and/or cultivate horticultural crops in a sustainable manner based on sound biological and technological principles.

PLO 3. - Explain the relationships between agroecosystems, economics, human culture, and natural environments

PLO 4. - Design gardens that demonstrate aesthetic principles. (hort & landscape only)

b) Program or Unit/Service Outcomes Reviewed this year: PLO #2 was assessed in Fall 19 in AG 235 Irrigation Design. A very comprehensive and difficult final project is assigned in this class. Students are tasked with designing an irrigation system for a house landscape.

This requires students to measure a site, transfer that to scale on large vellum, then choose and layout sprinklers and drip irrigation, section for valves, size pipe, determine friction loss and determine precipitation rates and program run times. They also use this drawing to determine the "take off" list of materials that would be needed to install the design. This requires symbolic reasoning with scale drawing, collecting technical information from manufacturers' catalogs, using that information to make numerous calculations and design decisions, and communicating information in written and graphic form to the "customer" – the installer, the customer, the instructor
PLO #1 was assessed in Spring semester in AG 230 Ag Business. Students do a comprehensive business plan for either a real family business or a business they try to envision. This is also a very intensive final project that includes not only envisioning but estimating costs of production, cash flow, balance sheets and income statements and evaluating the potential for the proposed business.

c) Assessment Results. For PLO #2: Six of eight students who attempted the final project completed it successfully with over 80% success. Two students had scores under 70% as they did not complete all sections of this assignment. The students who did finish the assignment all did well. This course has been "flipped" so that more time has been spent in class working on this assignment as well as assignments that lead up to being able to do this large project. Additional step by step in-class work needs to be done in the future. As this assignment is not only difficult it is very time consuming so some students balancing work, homelife and school struggle. However, this final project and the lead up assignments are used as a "100 level" Math equivalent so it's important that students are able to demonstrate their ability to combine all of the skills that this project demonstrates.
   For PLO#1: The eight students who turned in their plans all were successful with over 70% assessment. Four students dropped out of the course prior to or soon after the class went online due to COVID. The most difficult part of this assignment is the "numbers". Unless the student has a business already with real numbers to use, it is very difficult for students to estimate things like cost. One good thing coming out of the zoom environment was that I could walk each student through spreadsheets one on one over zoom. This was really helpful. It took more time but I was better able to demonstrate how to estimate and how the spreadsheets related to each other, than trying to get around the room and look at paper copies. More students sought help over zoom than they did when they could come to my office. I will use this method in the future and schedule each student to review their spreadsheets with them and assist them with building their spreadsheets. This will help them over the hump of the most frustrating but useful parts of the business plan exercise so they can analyze their results more clearly.
d) The assessments were carried out using rubrics. These broke down the projects in sections so that different parts could be analyzed and strengths and weaknesses determined
e) Changes: Irrigation project success has improved. The class uses a class project done together as an example. This way students are walked through the steps of the individual final project. I will need to push students to start their own scale drawings earlier rather than

waiting after we have covered most of the project topics. Increasing in-class time on final project should help them be more successful. Installing a system by mid-semester as a class project is vital to the success of them being able to design a system.
More resources are available for small agricultural business plans. Using zoom to work one on one with students with the difficult statements will continue. Working with them to build their confidence in estimating and building spreadsheets will improve their understanding of business planning.

4. Action Plan

The budget crisis brought by COVID is an opportunity to review and analyze the program. The forced movement to online in Spring, although increasing the comfort level of using online tools like zoom, did not expose a meaningful path to distance learning for the program. Our hands-on approach of teaching hands-on skills in tandem with academic knowledge, makes the AGNR program difficult to translate to strictly online learning. Providing students with not just traditional labs but larger scale projects and small but commercial scale cropping experiences is the strength of our program and the Community College experience in general when compared to Bachelor programs.
Keeping robust in-person and on campus labs and projects is vital to developing workforce skills for our students. This dovetails with our mission of providing a supportive learning environment that emphasizes skills, community and sustainability. The challenge is increasing our student majors and keeping courses enrolled with sustainable numbers.

Action Plan:
Agriculture program PCC met this summer to share distance learning ideas. A larger group was convened in Fall 2020 to reflect on ways to mitigate budget issues. Each campus program is unique to some degree and each has strengths. It was agreed where possible, to leverage those strengths to benefit students across the CC system. Classes such as GPS that lend themselves to distance learning could be shared. Certain specialty courses such as forestry or agripharmitec could be offered as electives across the CC system. Other courses could also be shared or single students who need a course to graduate could take it online from another campus. Providing the labs will be the challenge and therefore not all courses would work in this manner. Only certain courses with simpler labs that the student's home campus can support would make sense for this scenario. However just a few of these types of offerings could allow for more timely graduation, provide a greater diversity of courses for students, and perhaps allow some campuses to eliminate some shared courses from their campus offerings. This effort will take coordination and support from faculty and administrators from across the system.
-Internally, the Ag program will focus for the next two years on the Sustainable Crop Management AAS as students seem most interested at this time in production rather than landscaping. Sustainability (regenerative agriculture) will continue to be a focus. Our partnership with GoFarm Hawaii has strengthened this major as they provide a Farm Coach ATP via grant funds. The Coach allows the program have yearly cohorts without the faculty having to do an overload, helps recruit students, connects with industry and increases our R-fund earnings. At the same time GoFarm provides expertise and special services to students such as business planning even after they finish the CO. GoFarm students are also encouraged to take additional courses or even consider an AAS

degree. Two students from the 19-20 cohort are taking courses in Fall 20. (perspective: COVID uncertainties did make recruiting difficult and course enrollment was limited)
-The program will be looking at elective courses and determining if some should be deleted and provided by other campuses.
-The program will continue to work with USDA ANNH consortium grant. Grant is currently exploring recruitment videos. This grant provides a strong system connection as well as considerable funds to support students directly, pays for tools and other long-term supplies, and provides lecturer funds.
-The program continues to support its considerable consumable supply needs via sales to replenish the AGNR revolving funds. These sales directly support student learning by design growing and selling production is not a distraction or the ends to the means for the program. However, the program has not used G funds for supplies for decades. This reduces the strain on the STEM budget as supplies run generally $10,000/year or more.
-The program would like to work with SSM program to see if they could incorporate AG courses into their lower division program map. This would take considerable curriculum work, so would require cooperation of the SSM coordinator and faculty. SSM may offer upper division "AG" related courses. If so, I would like them to consider 200/400 type of offering.
-Put courses up for Sustainability designations.
-Be poised to make curriculum changes as system or industry trends materialize.
-Work to improve marketing program: video with ANNH consortium, improve website and social media presence.

Trends in "AG" in Hawaii and Maui:

- Agriculture is an area of interest to diversify the economy. Food system fragility was highlighted with COVID as well as over-dependence on tourism. Governor has targets for increasing food production in State.
- Maui County voted for its own County Agriculture Department
- Value-added products need to be developed to increase marketing opportunities and increase consumption of local products. (example: ulu flour to replace fraction of imported wheat flour) Marketing will be needed to shift consumer preferences.
- Recognition of need to increase marketing capacity (food hubs, coops) to leverage ability of small growers to provide for large markets such as retail, institutions.
- Support in community for local products has increased.
- Organic and regenerative practices will increase or be demanded by consumers.
- Opportunities for carbon sequestration by soils with regenerative practices – if carbon marketplace materializes – could be an additional source of income for farms and conservation projects.
- Mahi Pono – large expansion of diversified crops on Maui. As this company develops, they will need trained people. Many experienced workers will retire out.
- AG Tech – AI, robotics, remote sensing, data, bioinformatics, biologicals (such as soil microbiome management or supplements; plant growth stimulators, and plant genetics) are changing Agriculture. Mahi Pono is probably going to lead in these areas but this can bleed over into smaller operations.

- Small human scaled (1-5 A) high value crop operations are expanding both here and on the mainland. GoFarm Hawaii and UH Maui college are targeting this type of operation for student entrepreneurs.
- Building of housing, condos, time shares etc. continues on Maui. The landscape and nursery industry will keep expanding.
- Native plants being used more and more in landscaping. Conservation and restoration projects (fencing, replanting) have also increased. Many, many internship opportunities for students to enter conservation workforce.
- Agriculture and Natural resources are truly "green jobs" that can continue in perpetuity. (Forest restoration or farming or a landscape – do not get finished in a few years and pau. A forest restoration project is at least a 100-200-year project if not longer, a farm should be passed down generationally) The global pandemic pointed out that farmers, farm workers, landscapers and conservationists are essential workers. Demand for employees in these sectors will remain strong. The opportunities to start a viable business are increasing.

5. Resource Implications

An agriculture program, like many CTE programs, is expensive. Facilities and personnel to maintain living labs year-round are required. Consumable supply needs are constant. The program has mitigated some of these costs by active work to maintain and replenish a Revolving Fund, by writing a yearly USDA ANNH consortium grant, and partnering with GoFarm Hawaii to bring a paid APT to campus. The program has gotten leaner over the years – with one instead of two faculty on Maui, two-year cycle of course offerings, the loss of faculty on Molokai and the Molokai farm, and G-fund support for supplies down to zero.
The program looks forward to working with other campuses. Cost savings however are likely to not be dramatic as labs will still need to be delivered, facilities maintained, and most lecturers have been supported by grant money. Ideally cooperative efforts will allow some streamlining while providing students with broader work-force skill development, and perhaps faster paths to graduation.

X I am NOT requesting additional resources for my program/unit.