Welcoming A New Farm Manager

By: Aleysia Kaha

We are very happy to hire Matthew Wung as our new UHH experimental farm manager. A former CAFNRM student, studying General agriculture as well as born and raised here, has 30 years working with local farmers through NRCS. His family grew up raising cattle on 400 acres of land in Mountain View and although that land was sold many years ago, Wung is still very passionate about raising cattle and now raises flowers. When asked what he would like to do most as the new farm manager, his answer was simple, “I am excited to move forward, make a good difference.” When he was a student, he remembered building the perimeter fences that are now falling apart; when looking at all the pieces that make up the farm, “from nutrient management, forest management, pest management, etc.,” he believes that this farm will be making improvements one step at a time.

His advice to students as a CAFNRM alumni, “Stick with it and find your goals, I worked temporarily, as a student co-op, on and off with NRCS and I could’ve taken any path in life… I am glad that I stuck it out.”

Agriculture Club– Exploring Cacao

By: Tiera Arakawa

If you are looking for fun and adventure throughout the school year, a club to consider is the Agriculture Club. The Agriculture Club goes on adventures, tours, does projects that the students would like to do, and volunteers with various jobs of interest. Since my Sophomore year of college, I have realized how important it is to get involved around the campus, find ways to give back to the community around us, and make long lasting friendships. For that reason, I decided to join the Agriculture Club because agriculture is what I am passionate about and I like to know that the little things that I do, especially volunteering is making a positive impact in our community.
Agricultural Innovation for Resilience and Rural Development in Hawaiʻi

By: Dr. Bruce Mathews

Whenever there are allegations of pollution or health risks generated by a medium or large scale agricultural operation there are always people who blanket attack modern agriculture, technology, and corporations. They then often advocate for small farms, production methods of the past, or even worse strongly endorse unverified “miracle” practices. The problem with looking too much to the past is that it can stifle support for innovation which is key to a resilient food-secure future, and rural economic development. Furthermore in our often romanticized view of small farmers feeding half the world we tend to easily forget that many of these people live on a subsistence diet and frequently suffer hunger and malnutrition due to low and (or) inconsistent yields.

A huge problem with the concept of sustainability is that what can be sustained changes with time, technology, resource availability, population pressures, climate change, economics, cultural norms, etc. Furthermore, sustainability has lost some of its luster as a buzzword in agriculture because many of its advocates have little in depth understanding of the underlying biogeochemical processes and biophysical constraints impacting food production stability relative to societal needs, soil carbon storage, water quality, etc. Land use needs to be much better aligned with land potential if the dual goals of improved local food security and reduced environmental harm (farming without harming) are to be achieved (Liebig et al., 2017). The fact is that most people have limited understanding of how the food they consume is produced, including those who primarily purchase certified organic.

Are we in Hawaiʻi committed to feel good gardens, part-time hobby farms run by retirees, and rural gentrification or are vibrant agricultural industries with next generation facilities and equipment going to be a high priority for the economic and social development of our rural communities? Agricultural modernization is essential to enhance the productive capacity of environmentally-friendly integrative farming systems, farm worker and food product safety, and thereby economic return per unit land area.

During the past few months I have been increasingly approached by long-term small to medium scale farmers expressing concerns over advances they have seen in the US mainland and Asia with respect to improving farming practices through mechanization, automation of various aspects of production, sensor control systems, precision water and nutrient management, emerging applications for low-cost unmanned aerial systems (UAS), low-energy drying technologies, novel ways to exclude pests from crops, genetic improvements with high-yielding locally-appropriate crop cultivars and animal breeds that have been achieved through functional genomics work with molecular markers, informatics and production simulation modeling, and inventory control and tracking systems.

In order to maintain economic viability farmers are having to shift from inefficient (poorly optimized), resource-input driven enterprises to those driven by the latest science and technology. A long-term East Hawaii farmer recently told me that he has essentially had to become an agricultural systems engineer who must constantly evaluate the latest technologies, market dynamics, and safety compliance methods in order to remain in business. Furthermore, it is globally apparent that far too many farmers are lacking the requisite quantitative and technical reading skills to correctly calculate application rates of inputs and perform optimization analyses for comparative business scenarios. Farmer knowledge gaps contribute to low economic yield returns relative to those that are realistically achievable and also frequently lead to greater pollution and wasted resources (West et al., 2014).

Continued on page 6
Agriculture Club Exploring Cacao
continued….

I also feel that now that I am involved in the Agriculture Club, I have a lot more connections with the people in the College of Agriculture. From talking to other students, I am more aware of the things that go on around the college.

The first trip we went on was a tour on a cacao farm owned by Tom Sharky, and our tour guide was Colin, an alumni of UH Hilo College of Agriculture. The first thing he showed us on the farm was all the cacao trees, they were all attacked by a fungus-like pathogen called Phytophthora palmivora. The pathogen is one that lives in the soil and infects the cacao tree, creating black pod rot on all the cacao pods. Sharky got fed up with the fungus because it infected all of his trees and ended up doing major pruning on the them. I have never heard of the fungus before and what it does, but now that I am aware of it, I will be spreading the word out to help inform other farmers. The next thing we got straight into was cracking all the cacao pods, there were about over 500 of them(1). There were people cracking the pods and many hands to help take out the beans from the pods. It was a very unique process because all the beans were attached to something called the placenta. We had to take all the beans off the placenta and put them into a bucket to then go into a juice drainer(2). Once all the juice from the beans were drained, they were put into wooden fermentation bins with holes at the bottom for air(3). The beans would be turned every so often to complete the fermentation process. Colin showed us a comparison of what the beans looked like when fresh and successfully fermented. When the bean was fresh, the inside was a purple color with very compact air holes and when the bean properly fermented, the inside was brown with the air holes gone. I believe this method of checking the beans was called fishering(4). Then when the fermenting process was done, the beans were poured onto chicken wire to dry(5). There were already some cacao beans that were dried, along with coffee beans and they looked very pretty(6).
Agriculture Club Exploring Cacao continued….

This tour was such a unique experience for me because I didn’t know much about cacao, but now I have a better understanding of what it’s like to process it and if by any chance I would want to get into it more. It’s definitely something that I would want to go back to help volunteer, especially after seeing how many cacao pods they have to crack with only a small amount of people. Also, even though our day was busy cracking cacao pods, we made room for getting to actually try their chocolate which was awesome. I’m not a person to usually like chocolate, but learning how their cacao is processed, I really liked how their dark chocolate tasted. Their chocolate was 70% cacao and it didn’t taste like any other dark chocolate I’ve had before. On a side note, I also learned that cacao beans have many benefits when raw, especially targeting your happy hormones.

Agriculture Club— Exploring Waipi`o

We stood facing our hosts, our teachers for the day, the kua`aina of the valley. Following traditional protocol, the chant Kūnihi ka Mauna presented us to Waipi`o Valley, and more specifically Ka`ilipu`ueo. ‘Ama Lilly, vice president for the Agriculture Club, lead us in this chant. It allowed the club not only to present themselves in reverence to a place rich with Hawaiian traditional legacies but also helped to set the tone for the day ahead.

We began the days’ lesson while facing into the back of the valley. Kumu Keali‘i held out his left hand and pointed to each finger like a map, naming the five water sources which feed into Waipi`o Valley; “Hiʻilawe, Kunaka, Waima, Kawainui, and Alakahi.” Throughout the day our students were introduced to the cultural significance of the valley while learning about the agricultural history of this place. Passed down from farmer to farmer, these taro patches have been well irrigated, the landscape shaped through generations of subsistence farming. The `auwai (canal) danced along the side of each patch, flowing through silt and sand and settling into the man-made terraces (lo`i) that make a home for their kalo. Kumu Keali‘i pointed at the streams that feed into the lo`i, irrigating 6 smaller sections of wetland taro. He spoke of the importance of knowing where your water comes from and understanding how the ebb and flow of water through your patch can be adjusted to meet the needs of your kalo. They lowered the level of the water as we prepared to plant, explaining that the level will be raised as the plants mature, allowing a constant flow of cool clean water.
Agriculture Club– Exploring Waipi`o continued...

Listening to the stories, and preparing for work knee deep in nutrient rich soil and cool waters, between the legs of the valley, and at her fertile womb, we felt impregnated with the knowledge that was shared and all the hard work that created this lo‘i. That day, the CAFNRM students each harvested at least 20 large kalo and helped to clear and clean one lo‘i. Next we were divided into two teams, using the kalo that we had harvested and cleaned we began setting lines and planting the huli (taro slips). In full circle, we were able to observe the work that these farmers had already done to shape the landscape, worked our hands in the soil and planted the cuttings that were harvested. Our club is very appreciative for the experiences we made that day and the knowledge that was shared from one of our own students and her father.

Top: In a line, each student harvests 20 kalo, being mindful to pull encroaching weeds and separate mulch from kalo that will be planted later.

Middle: CAFNRM student, Tali, plants kalo in the new taro patch.

Bottom: Agriculture Club enjoying the stream after a hard days work!

Join The Agriculture Club!

Every other Wednesday from 1pm-2pm, the Agriculture Club has a meeting. During these meetings, students share ideas about ways to improve the College of Agriculture, Forestry, and Natural Resource Management. In some ways, the club does this through events, fieldtrips, and service.

Left photo: Students listening to Hawaiian Crown representative talk about job opportunities and the future of cacao in Hawaii’s local industry.
Deans Corner continued….

China has identified the collective effect of smallholder grain farmers lacking such proficiencies to be a major source of their non-point source agricultural pollution (Zhang et al., 2016).

If we are going to revitalize Hawaii’s agriculture after many post-plantation era false starts then we need to accelerate agricultural modernization and enact reforms to improve farmer income and incentivize farmer investment in technological improvements. There is also definitely room to keep farmers and agricultural students better informed of the latest global developments in agricultural technologies and markets. We should not take the approach that most of our farms are too small for such considerations as innovations frequently lead to rapid lowering of costs for technologies originally geared for large farms. And students never know where life will take them so they need to be informed at a level where they are relatively comfortable with all forms of production agriculture even if all the required resources are not presently available in Hawai‘i. This is the visionary approach that is being taken in many parts of Asia, even in resource poor areas where many young people are surprisingly ambitious and industrious. We have much for which to be thankful however if we don’t instill in our youth greater overall initiative and willingness to venture it is at our own peril.

We also must fundamentally change agricultural research through farmer participatory innovation to assess new technologies and production systems. The results obtained from small highly uniform research plots at universities often do not translate well to field-scale operations of farmers. This is particularly true when the small plots receive greater and more timely management interventions in terms of weed and pest control than is practical for farmers and the have far less soil and topographic variability than is found on real farms. For example, uneven biological nitrogen-fixation by a leguminous cover crop resulting from variations in soil conditions at the field scale can have huge implications for yield of the economic crop. Kravchenko et al. (2017) suggests that this variability at the field-scale is one of the reasons why field-scale yields in organic systems often do not match yields projected from small plot research to the same degree as conventional management practices based largely on blanket applications of chemical fertilizer nitrogen. They argue that we must be extremely careful in extrapolating small-plot yields in organic and low chemical input systems to farmer’s fields. We also know that field-scale operations of farmers can result in more rapid build-up of pest populations than small plots and that organic operations do not have many approved options in terms of immediately effective crop rescue chemicals. Another major factor to consider, particularly in Hawai‘i, is staying on top of the weeds in organic systems especially when the weather is not conducive for mechanical intervention. There have always been those who dream of a Big Island organic farming paradise yet little will happen without strategic and fundamentally sound commitments to progress in science and technology.

Food and rural economic crises can be reduced in magnitude or avoided outright by the decisions we make. There is no revolutionary alternative to investing in the applied STEM and social sciences, farmer participatory field-scale research, and associated outreach needed to revitalize Hawaii’s agriculture and rural economies. The ways relevant applied science and new technologies can be best put to use on farms, entities supporting agribusiness, and rural development needs to be assessed through a solid partnership between public and private local experience. We have urgent problems to be solved in Hawaii’s agriculture and rural communities and the quest at the university needs to focus more on these matters through a systems thinking approach rather than on reductionist academic understanding for its own sake. To be a relevant and empowering partner for the community we need to keep our roots in reality.

Citations on last page.
Gendered Fields: Women, Agriculture and Food Resiliency – New Fall 2017 Course

Brooke Hansen (Anthropology/Agriculture)

Agriculture and Gender and Women’s Studies come together in the fall for a unique course on the role women have played in farming, agriculture, food production and food resiliency throughout human history. The course will examine this history and current global scope of women’s involvement from interdisciplinary lenses, including social sciences, women’s studies and agricultural sciences.

In both rural and urban settings, strategies for developing strong and resilient food systems at multiple scales will be explored from backyard subsistence gardens to “women feeding cities.” The recent rise in women farmers has prompted the formation of many new associations (e.g., Pennsylvania Women’s Agricultural Network), Facebook groups (e.g., Women Who Farm), and theoretical frameworks (e.g., FAST – feminist agri-food systems theory). Other key topics include creating gender sensitive outreach in agricultural development and extension services and women’s roles in food production movements from urban farming to community supported agriculture.

The class will review the recent survey done on Hawai‘i women farmers by the O‘ahu Resource Conservation & Development Council and discuss enlightening new books such as Soil Sisters: A Toolkit for Women Farmers and Farmer Jane, Women Changing the Way We Eat.
On May 12, 2017 CAFNRM faculty, staff, and students gathered with friends and family to recognize and honor the path it took for our graduating seniors at the Bi-Annual “Senior Awards Night”. With music by Tropical Horticulture Associate Professor, Dr. Norman Arancon and CAFNRM alumni, Herb Loa’a, the evening was full of smiles, laughter and conversation. As the evening continued, Animal Science Associate Professor gave prayer for the food and recognized all the elements that came together to make the evening special. As we all came together to recognize the achievements of the students we also gave thanks to the professors that guided them along the way. Each graduate received a College of Agriculture Medal recognizing their commitment to CAFNRM as well as a gift and leis from the faculty. Surrounded by good food, good music, good memories and good people the night was a success! Big Mahalo to the Agriculture Club for helping to put together the event as well as the UH-foundation and our CAFNRM dean, Dr. Bruce Mathews for funding the event. Thank you to the faculty and staff for their gifts and participation in support of their graduating students. It truly was a special occasion for all of those who joined. 

Spring Graduates—22 graduating with specialties in:

- Agriculture Business
- Animal Science
- Aquaculture
- Pre-Veterinary
- Tropical Horticulture
- Tropical Plant Science and Agroecology

Thoughts from our 2017 graduates:

- “The plant tissue culture courses I took with Dr. Tanabe was the best part of my college career. All the instructors were very helpful and caring. And I’m very grateful for their passion and willingness to educate us on the various aspects of agriculture. To new and ongoing students – four years of college may seem like a lengthy journey but it’s not. College goes by fast. If I could do it all over again, I’d do somethings differently. So, manage your time wisely and do your best!” -Risa Kabua Myazoe, Tropical Plant Science and Agroecology

- “For future students coming into CAFNRM start off slow and figure out what classes you like never rush into anything. Talk to your professors, get help if needed and never procrastinate it never works out well in the end.” -Makana Ako, Tropical Plant Science and Agroecology

- “The two most important things I took away from being here was 1. If you want to truly learn you have to learn the material not memorize it. 2. This portion of college needs to be taken seriously as it is the foundation for your future. My advice to future students. Use this time here at CAFNRM to explore the various opportunities, make connections with your fellow peers, and professors. Do not be afraid to ask the professors for help/advice no matter how intimidating they may be…Lastly love what you do and be the best you can be at it, don’t settle for anything less.” — Alohilani Kapoi, Animal Science Production Specialty
One of more than 1200 species of *Senecio* globally, *Senecio madagascariensis*, fireweed, or Madagascar ragwort is of specific concern to Hawaii. Having been established in Hawaii within the early 1980s, it has continued to climb the chain as an invasive, dangerous, and noxious weed.

*S. madagascariensis*, an upright, branched mostly annual herb, growing from seed, that generally grows to heights between 4-24 inches tall. Its narrow, bright-green, alternating leaves can reach 2-5 inches in length and ¼ inch across, often lobed and can demonstrate a smooth or serrated edge. The inflorescence is terminal and comprised of both disc and ray florets. Dull to bright yellow in appearance, similar to a common daisy, mostly displaying a 13-patterned ray floret count. Additionally, each type of floret, disc and ray, produce seed.

As stated previously, fireweed has annual tendencies, however it has been identified as reproducing vegetatively, this was illustrated when the stem was trodden or trampled close to moist soil, resulting in new root and shoot growth at stem nodes-as a perennial often demonstrates. Producing a shallow, yet highly fibrous tap root adds to the weeds efficacy in various substrate types. Each flower has the potential of producing 150 seeds, yielding individual plant production of approximately 30,000 seeds. Seeds or achene, are slender, cylindrical, and about 1/10 inch long. Tufted with white fine hairs, the seeds are easily dispersed by air and waterborne methods.

A primary concern brought about by this weed is its ability to rapidly spread and its danger to livestock, if ingested. Along with its ability to produce large amounts of seed per plant, its seeds are viable for several years and often grows prolific in pasturelands, roadsides, and disturbed areas. 25 out of 1200 separate species of *Senecio* have been determined to be toxic to animals. It is strongly believed that *S. madagascariensis* could be number 26 on the toxic list. The principal toxins in these species are compounds known as pyrrolizidine alkaloids (PA). PA concentrations vary with the species and their growth stages. Generally, young plants are more toxic than older plants. Agriculturally important animals in Hawaii that have susceptibility to PA are pigs, poultry, cattle, horses, goats, and sheep. Studies have been conducted with tansy ragwort (S. jacobaea), threadleaf groundsel (S. douglasii), and Ridell’s ragwort (S. riddellii), among others, for effects of latent PA levels in livestock from ingestion. Pyrrolizidine alkaloids are secreted in the milk of cows and goats and in low quantities can cause mild liver changes in calves and kids consuming the milk. There is no evidence that humans are adversely affected by consuming milk that contains PA. Pyrrolizidine alkaloids are readily absorbed from the digestive tract of the animal and transported to the liver. Enzymes in the liver convert PA to toxic pyrroles, which are the principal toxins causing liver cell damage. The pyrroles biodegrade following reaction in the liver and thus do not accumulate in the animal. The greater the exposure of the liver to pyrroles, the more liver damage occurs.

Happy gardening…

[http://www.oahuisc.org/fireweed/](http://www.oahuisc.org/fireweed/)

Belonging to the Moraceae (Fig or Mulberry Family), breadfruit or ‘ulu in Hawaii encompasses four primary sub-species: *Artocarpus altilis*, *Artocarpus incisus*, *Artocarpus mariannensis* or *Artocarpus communis*. Grown in the Hawaiian Islands, as well as throughout the Pacific Basin area. They have been hybridized and many diversities have become prolific. There are currently 24 distinct species of breadfruit. Fruit size, shape, coloration, seeded or seedless, and seasonal ripening are a few of the differences. The breadfruit tree is a large evergreen, growing 40-60 feet in height with lateral branch spreads that commonly exceed 30 feet. Its woody primary trunk can be 2 feet thick while its lateral branches are much smaller in diameter. Its distinctive 7-11 lobed dark green leaves grow alternately on stout leafstalks of 1-2 inches. The elliptical shaped leaves measure 15-20 inches in length and 8-12 inches wide. The distinctive leaf shape forms from finely haired buds, 5 inches or less in length, which are located at the branch nodes. Breadfruit is monoecious or having both sex organs within a single tree. The staminate male flower, located at the branch tip grows upright and is yellowish-green, while the pistillate female flower forms a large ball, located just below the male flower. The fruit develops from the female flower and is made up of thousands of fertilized fruit growing together around a core that encompass the breadfruit in its entirety. Propagation is by root cuttings, suckers, or layering and in the seeded variety, by seed.

Equal to if not more than the variety of ‘ulu or breadfruit is its uses. Generally speaking, the entire tree can be categorized into a multipurpose and useful resource. As is commonly known, human consumption of the fruit and seeds, where available, is practiced in many forms, however breadfruit uncooked is also used to supplement livestock feed, and the large swaths of shade produced by the tree offers areas where more sun sensitive foods can be cultivated. The timber is used for housing, canoes, furniture, and firewood. The large leaves are commonly used to cover cooking pots, earthen ovens, and as wrappings for food storage, while the sticky, milk-like sap produced from the tree can be used to water seal cracks in housing, furniture, and canoes, like caulking prior to painting. There are strong suggestions of medicinal qualities also associated with the breadfruit tree.

As with many residents of Hawaii, I am very familiar with ‘ulu, however am very uncertain about the how’s and where’s of making a meal including breadfruit, so I thought it customary to offer an easy rendition of breadfruit salad below.

**Breadfruit salad**

- 2 cups cooked mature breadfruit
- 1 cup finely sliced vegetables, such as cucumbers, Chinese cabbage, or carrots
- 3 tablespoons chopped onion
- 1–2 tablespoons lime or other citrus juice
- 1 chopped hard-boiled egg,

1. Cut the cooked breadfruit into cubes.
2. Combine all ingredients.
3. Serve on greens such as watercress, or on edible hibiscus for a decorative touch

Happy growing…

www.ctahr.hawaii.edu
SNAPSHOTS: *This section features faculty and students of CAFNRM and their hands-on activities* (photos by Armando Garcia)

Aquaculture of Fishes lab, Dr. Garcia and students harvest large Siberian and Russian sturgeon at a private farm in Hilo.

Aquaculture of Fishes Lab, students anesthetizing adult farmed Kahala for tagging.
SNAPSHOTS: This section features faculty and students of CAFNRM and their hands-on activities (photos by Risa Kabua Myazoe)

Dr. YiQing Li, takes his students on a field trip in the partially native forest to observe soil characteristics.

The Beekeeping faculty and students help to construct a large beehive.
On March 9th, the agriculture club put together their first movie night, showing “Symphony of the Soil.” Taking over the classroom, we shared snacks and a movie with our CAFNRM dean, Bruce Mathews, former professor of soil science.

“It was good, it’s nice to have a social event for the club. I didn’t get that into what we watched but was still fun to bring food and chill out.” –Jacque

In an effort to give back to the CAFNRM facilities, the students in the agriculture club voiced that we should have “Give Back Days,” where the CAFNRM students, faculty and staff could help to get work done at either of our three facilities: The College of Agriculture Building, The Pacific Aquaculture and Coastal Resources Center, and UH Hilo College of Agriculture farm.
On the afternoon of April 13th, the College of Agriculture Forestry and Natural Resource Management of the University (CAFRNM) of Hawaii at Hilo held an agricultural fair surrounding the College of Agriculture building. The fair highlights student projects from the different courses of college ranging from value-added products, vegetable harvests from the campus gardens and animals from the UH Hilo farm. The fair was open to the public to come and celebrate the bounty of the students’ work and give appreciation for the presence of horticulture and agriculture in our community.

All around the College of Agriculture building tables were set up as booths displaying numerous fields of study and plentiful harvests. One booth hosted a homemade aquaponics system in which people could see how fish waste can be used for nutrients to grow produce. Another booth was filled with small cups of fresh honeycomb that came from local hives. The booth run by Sustainable Agriculture 230 was packed with harvested turmeric root and cacti cuttings for the taking as well as prepared packages stuffed with mint.
Continued from Deans Corner...

Citations:

