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Formed in June 1986, the Landscape Industry Council of Hawai'i is a state wide alliance representing Hawaii's landscape associations: Aloha Arborist Association, American Society of Landscape Architects Hawaii Chapter, Hawaii Association of Nurserymen, Hawaii Island Landscape Association, Hawaii Landscape and Irrigation Contractors, Hawaii Society of Urban Forestry Professionals, Kauai Landscape Industry Council, Maui Association of Landscape Professionals, Professional Grounds Management Society, Big Island Association of Nurserymen, and the Hawaii Professional Gardeners Association.

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PRESIDENT'S LETTER

BY CHRIS McCULLOUGH



LICH NEWS

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ALOHA KAKOU LICH AND GREEN INDUSTRY MEMBERS

On January 17th both LICH and the LICH Foundation will hold our annual meeting at the beautiful Elk's Club in Waikiki. Steve Nimz is an Elk and has graciously helped us to utilize this fine facility a number of times for our meetings, mahalo Steve and the Elks Club for your hospitality!

At this meeting we as a Board and our supporting members are able to socialize and reconnect. Also, a great amount of important LICH and LICH Foundation business takes place, such as nominations for 2020 Board of Directors, election of Directors, announcement of the elected Directors for 2020, new business or announcements and our treasurers report by Mark Suiso. Garrett Webb will also speak to us regarding ETF funding, 2020 Certification, and his plan for the development of a LICH Executive Director Job Description. Also at this year's meeting I will outline my vision as LICH President for the future of our organization.

One of my topics will be the 'growing' of this magazine! I have always felt that Hawaii Landscape is a great publication (a huge mahalo to Chris Dacus for his vision and effort to bring it to what it is today!), with some of the greatest minds and experience in Hawaii horticulture graciously donating their time to write cutting edge articles on all things 'green'. To all of you contributors over the years mahalo nui! I believe our magazine has great potential to reach a larger audience all over the Pacific Rim, as we here in Hawaii are at the forefront of tropical horticulture. Look for a future article that will further describe my vision for Hawaii Landscape!

I will also speak about my vision for a new and improved Kapiolani park. As we all know Queen Kapi'olani Regional Park is the largest and second-oldest public park in Hawaii, located on the east end of Waikiki. The 300-acre park, named after Queen Kapi'olani, the queen consort of King David Kalākaua, is home to the Waikiki Shell and the Honolulu Zoo. This beautiful green space is one of the most utilized parks by both our kama 'aina and visitors. I believe this park can be a model for improvements at many of our county parks, and is a true gem for our local Ohana and visitor alike. More to come in a future issue on this topic as well.

I would like to encourage anyone who would like to participate in LICH to email me at christopher@difihi.com and let me know your intention to participate and kokua. We are always seeking new ideas and participants on the LICH Board, as either a Board member or as a Green Industry participant. Please join us! Together we can create a cleaner, greener Hawaii for all to enjoy!

Chris McCullough, LICH President



Attendees enjoying the view from the Waikiki Elks Lodge. From left to right; David Golden, Ilana Nimz, Christian Renz, and Taylor Marsh.

LICH ANNUAL MEETING

The LICH annual meeting was held at the Elk's Club in Waikiki on Friday, January 17th (mahalo to Steve Nimz for sponsoring us for this terrific meeting space!). Attendees were given a lei greeting from the lovely Ilana Nimz and we all were gifted with a beautiful Waikiki sunset from the upper deck of the club while enjoying conversation and cocktails. Sunset was followed by a delicious buffet dinner and more socializing (mahalo Elk's Club for the ono food and service!).

The meeting was then called to order, with various association representatives making their presence known. These representatives are HILA: President Christian Renz, MALP: Allison Wright, ASLA: Richard Quinn, HLICA: Steve Nimz, KLIC: Larry Borgati and AAA: Sergio Vasquez. Mahalo to all association representatives in attendance!

President Christopher McCullough then appointed Boyd Ready, without objection, as chair pro-temp. Mahalo to Boyd as he is an expert on these matters and his kokua is greatly appreciated!

Nominations for 2020 Board of Directors were then made by voting members and LICH member associations. Nominated from the floor were: Brandon Au, Allison Wright, Joshlyn Sand, Jason Ezell, Ray Ito, Strom Gaditano, Orville Baldos, Christy Martin, Edmundo Reyes, Chris McCullough, Richard Quinn, Randy Liu, Heidi Bornhorst, David Golden, Christian Renz and Taylor Marsh. All nominees were elected by acclamation.

Director Emeritus incumbents were also announced. (previously elected). They are as follows: Boyd Ready, Lelan Nishek, Steve Nimz, Garrett Webb and Chris Dacus. The incumbent emeritus directors were elected by unanimous consent.

Other Green Industry members in attendance were Brant Brown, Cheryl Dacus, Mark Suiso, Madeleine Shaw, Hannah Lutgen, Russell Galanti and Chelsea Arnott.

Election of Officers then took place. The nominees from the floor were: President: Chris McCullough, Vice-President: Lanky Morrell, Treasurer: Mark Suiso and Secretary: Richard Quinn. All nominees were elected by acclamation.

We then received a Treasurer's Report from Mark Suiso, and as a new business item former President Chris Dacus, who exhibited and distributed our new LICH plant posters, including Native Hibiscus and 'Ohi'a illustrations and horticultural information, for posting in members' businesses and public places. Outstanding work Chris, these excellent posters are really appreciated by all that attended, mahalo! Garrett Webb also updated us on ETF funding and the status of our LIC program. A warm ovation was given to Garrett for his triumphant return after a challenging health issue. Garrett, your contributions to our organization are recognized and greatly appreciated!

President Christopher McCullough then outlines his vision for the improvement of future LICH conferences and our magazine 'Hawaii Landscape', as well as his vision for improvements to our county park systems with Kapiolani Park to be a model for these proposed future improvements.

In all it was a great night of connecting and bonding with our LICH Board / core membership, and I truly appreciate the participation, great energy and mana'o of everyone who attended! We are blessed to have such great 'Green' individuals in our organization! Mahalo, mahalo, mahalo!

Our next annual meeting is to be held in January 2021. If anyone in our membership would like to join our Board please let me know, as new members and ideas are always welcome!

SYNTHETIC TURF

The State of the Industry and Science

by Russell Galanti

The lawn at Waikiki Beach Walk on Lewer's St., Waikiki. An example of one of Oahu's synthetic turf lawns

Take a walk down Lewers Street in Waikiki and you may eventually find yourself walking across the lush lawns of Waikiki Beach Walk. To the unassuming visitor who is ogling the shops and palm trees, the fact that they are walking across synthetic turf may go over their head (while being right under their feet). Realistic synthetic turf for situations like Waikiki Beach Walk are exactly what synthetic turf supplier companies like NyLawn and SynLawn® are trying to provide.

Rory Otto of NyLawn, a distributor of Synthetic Turf International products, sat down with me to discuss the industry for this article. Rory has been in the synthetic turf industry for 15 years. His beginnings in synthetic turf started out with the need for a good putting green, both for himself and for clients. Since then the industry has gone from primarily being used in landscapes to playgrounds then private schools and eventually Department of Education grounds. It was Rory who recommended I check out the beach walk at Lewers Street for a good example of synthetic turf in the landscape. We also discussed some of the best uses for synthetic turf. Areas where lawn equipment noise is not tolerated, like the curbsides of urban residential areas for one example. High traffic areas near sidewalks and in dog parks is another example. According to Rory the industry is growing, especially in commercial applications like shopping centers and large apartment complexes. One of the most desirable characteristics of synthetic lawns is the reduced maintenance costs. Landscapers can still offer services like maintenance brush ups, cleaning, weeding, and applying enzymes for controlling animal wastes. In fact, weed management is the largest maintenance requirement according to interviewees. Weed seeds can blow in or be deposited by animals and when large rain events occur those weeds seeds inevitably germinate and require removal.

Brant Brown and Santiago Montone from Hapa Landscaping also sat down



Rick Barboza shares his passion for native plants and some new varieties he's working on.

with me to discuss their synthetic turf branch, SynLawn®, another brand of synthetic turf. Hapa got into the synthetic turf arena around 3 years ago and now about a quarter of their business is synthetic turf. SynLawn® itself has been available in Hawaii for about 15 years, according to Brant and Santiago, and SynLawn® has another supplier partner on Maui as well. Around 1,000 sq. ft is the average size of a job area that these gentlemen usually install, and the usual clients are residential and commercial. Roof and courtyards of hotels are popular areas for installation. Their best-selling product is a lawn called X47 but the types of products run the gamete, from a bio-based product made from soybean and sugarcane residues (S47) to brightly colored turfs for sports and playground use.

Despite some differences in product availability and clientele, everybody I spoke with agreed that buying U.S. made synthetic turf is the way to go. Much of the synthetic turf produced in America comes from Georgia, also called “carpet country” due to the large-scale production of carpets in the state. And what better facility to produce synthetic turf than a retrofitted carpet factory. There is also consensus on mistakes to avoid when installing artificial turf to make it longer lasting and more appealing. Using unqualified technicians is at the top of that list. There is a new certified installer program being offered by the Synthetic Turf Council (STC). In fact, now is a good time to mention the STC, which is the trade association for the synthetic turf industry which offers services through advocacy, marketing, education, and networking. Mistakes are also commonly made when connecting grading the stone base fill beneath the turf, concealing the seams between rolls, and tucking and sealing perimeters. It is also essential to use in-fill in between the microfilament grass blades to encourage the grass to stand up straight and not have a grain pattern or become tamped down from traffic.

There is heated debate about the use of synthetic turf. Quite literally, the day-

There is heated debate about the use of synthetic turf. Quite literally, the day-



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Some of the color variations of turf and infill available for use.

time temperature of synthetic turf has come under scrutiny, as well as its effects on human health and the environment compared to natural grass lawns. Let's start with the hot topic. Synthetic turf is generally hotter than live turf in the same conditions. Surface temperatures can reach up to 200° F¹. In fact, high surface temperature is about the only topic here that does not have publicly available evidence that could refute otherwise in defense of synthetic turf. Penn State² tested 11 different turf/infill combinations and still found that on a breezy 77° F day surface temperatures in these 11 combinations were all above 150° F on average. Irrigation has been looked at for ameliorating these high temperatures. Temperatures do drop several degrees but rebound quickly after³.

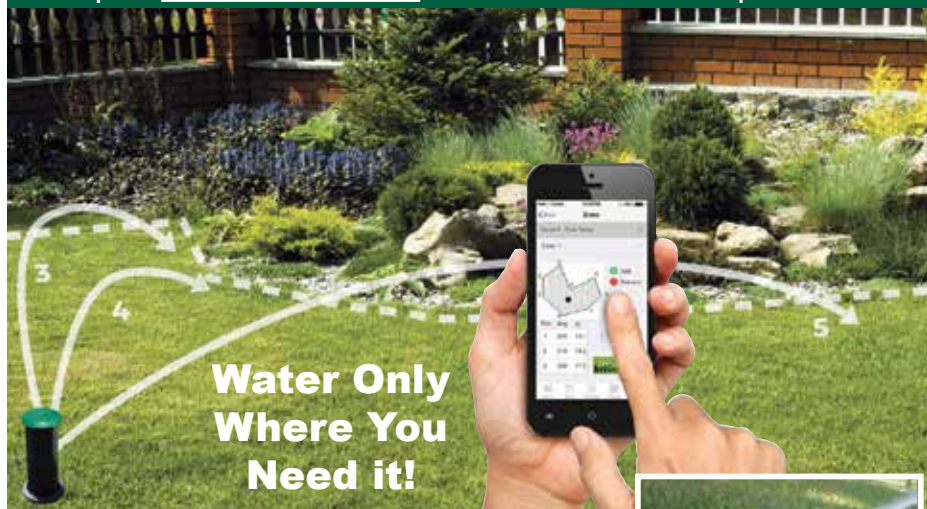
Next up, potential toxicity. Crumb rubber is one of the infill options for synthetic turf. Recycled crumb rubber is created from used tires and while it is not the only infill material it is a common one. Opponents of synthetic turf claim this rubber is toxic based on the fact that some states do not allow it to be dumped in landfills and dumping it in the environment is illegal. It is true that tire rubber contains polyaromatic hydrocarbons, phthalates, and volatile organic compounds. Oh fun, big chemical names. You may know where this is going. These compounds can pose a risk to humans and the environment in high enough concentrations. This crumb rubber is loose in synthetic turf and can become airborne during activity. Users can be exposed though accidental ingestion, inhalation, and dermal contact. There is a thorough review on the study of these issues⁴. While research is limited, it does show that the volatile compounds found in crumb rubber tend to be similar to samples located away from synthetic turf fields. Also, health risk assessment studies found that users of synthetic turf fields were not at elevated risk of exposure to the aforementioned compounds. The short of all this is that so far, most evidence points to synthetic turf being safe for humans, even more at-risk humans like children. But the bottom line is that studies are very limited and sample sizes are small.



An example of one of the biggest mistakes made when installing synthetic turf. The seam of two turf mats can be clearly seen.

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There have also been studies related to comparing injuries on synthetic turf to injuries on living turf. For the most part injuries have not been found to be significantly greater on artificial turf compared to grass. The reality is it depends on what the injury type is and what the sport is. In a study⁵ looking at NCAA football players, posterior cruciate ligament and anterior cruciate ligament injury events were higher in synthetic turf compared to grass depending on the division level, but other injury events were not significantly different. In fact, in another study head injuries were more common in high school athletes on living grass compared to synthetic turf. Injuries can lead to infections; some have thought to look at the difference in Staphylococcus aureus (Staph). It turns out there is no difference in Staph survival when comparing synthetic turf to living grass. You have just as much likelihood to become exposed no matter which type of field you are using. Proper maintenance of turf fields does require the fields to be sanitized to remove bodily fluids and animal wastes.

There are pros and cons to any material being used for outdoor areas, whether it is synthetic turf, living grass, or any of the other options (I'm looking at you, gravel yards). Proponents of synthetic turf believe synthetic lawns can be the solution to some areas. Synthetic turf uses less maintenance and water than normal turf lawns. As Santiago said, "You can say no to watering, no to maintenance, and yes to weekends." Synthetic turf also allows for a faster installation time compared to natural turf which needs time to germinate and/or root in. Synthetic turf also does not require fields to be off-limits during large rain events when conditions become too muddy. Synthetic turf does generally cost much more than natural turf for initial installation costs, potentially made up for in lower long-term maintenance costs. Ultimately, synthetic turf has a lifespan which is expected to be 8-12 years. That means they won't be going anywhere anytime soon. So take a look at some of the synthetic turf examples around and decide for yourself what their use could be.

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LICT TEST 2020



As you might know by now, the LICT Test this year will be a Computer only test that will continue to include the Written Tests as they have been given. Also included will be elements of the Field / Hands-on Test as previously been given but in a new form involving videos, photos, and multiple-choice questions. The PLANET Training Manuals that have been used as study material in our classes state wide will be the study guide for the 2020 LICT Test. Ornamental Maintenance, Turf Maintenance, Irrigation, and Softscape Installation will be the modules offered as in the past.

The LICT test is available right now at the NALP web site; https://www.landscapeprofessionals.org/LP/LP/Certification/Enrollment/Certification_Enrollment.aspx

BUT you may want to study and take classes before registering for the Test! Also, LICH will be adding the computer only test to our Employment Training Fund Matrix. That means the Workforce Development Division will be able to pay half of the \$445.00 test fee. This process will take a month or so to become available. Be patient; we will be in touch when ETF is available for the test.

If you are planning to apply for ETF for the upcoming classes, or the test, you will need to have ready a Federal ID# and a Department of Labor #-both required.

Classes that are now qualified for ETF funding: Kona LMT Classes (all or individual classes); Irrigation School (Lynnett Tohara, instructor); Maui LICT Training; Oahu LICT

Training Program. Class dates to be announced soon. Thinking about Starting a New Class or Workshop?

Here is what you need to have ready and sent to the Certification State Administrator Garrett Webb at palmsinkona@yahoo.com:

- Name of the Class or Workshop; Training Activity / Program Area
- Instructor Name and Qualifications (if new)
- Location (if new). Present approved class locations are: Pearl City Urban Garden Center; Pacific Pipe Company; Waimanalo Experiment Station; Palamanui, Hawaii Community College; Hualalai Resort at the Four Seasons; UH Extension Service at Kealahou; Maui College; and Kauai Community College.
- Target Audience. Can be General Public, but an employer will be needed to send someone to the class.
- Government Employees are not qualified to apply for ETF funding.

Administrators may want to keep in mind the total amount of ETF funds available from the State for each Island during the Dates of the Contract, November 7, 2019 and July 31, 2021:

Oahu \$560,000	Hawaii \$95,000
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For many years, electric lawn mowers were little more than a novelty, not a serious tool. I often thought, 'Why is it that this equipment is more like a toy than a well-made mowers, as the use of them is both 'green' in that they are less polluting, but more importantly, quieter than gas operated mowers, a big plus for residential and especially Resort operators who need 'quiet' equipment for their clients and guests. Most electric mowers were corded, meaning you were tethered to an electrical outlet, constantly moving the cord out of the mower's path. And the early battery-operated models were frankly a joke, a homeowner with a small lawn tool at best. The early types of battery-powered mowers (often expensive and underpowered) could rarely cut a quarter acre yard on a single charge.

That all changed a few years ago, when the mower industry began manufacturing quality, more commercial type battery powered electric models that performed

well enough to get my attention. Since then, other manufacturers have gotten serious about investing in lithium-ion battery technology, and the results speak for themselves. Today, the best battery-powered push mowers cut as well as comparable gas versions. These lawn mowers use lithium-ion technology to cut your grass and your carbon emissions down to size. No gas, no cords, no exhaust emissions, and minimal maintenance. They are powered by a single 36-volt Lithium-Ion battery. These 'green' lawn mowers are an environmentally conscious alternative to gasoline.

Although mowers that use an electric motor are still typically more expensive than gas mowers, a big part of that cost lies in the lithium-ion battery that powers the machine. But that investment can pay off in other ways. You can use your mower's battery to power other outdoor gear, power tools such as string trimmers, leaf blowers, chainsaws, hedge trimmers and more!

Some considerations in purchasing a lithium ion battery operated mower are:

- Cutting width
- The battery's run time
- How much time it takes to charge the battery?

A few good mowers to consider:

Ryobi RY40190-2B has a cutting width of 20 inches. The battery runs up to 70 minutes and takes 3-1/2 hours to recharge.

Stihl RMA 370 has a 16-inch cutting swath. Its battery's run time is 30 minutes and it takes only 40 minutes to recharge. There is now a self-propelled version as well. This is the mower I've used for years and I love it. It has a one lever height adjustment that is also terrific.

The Kobalt KM 2180B-06 has a cutting width of 20 inches as the Ryobi and 60 minutes of run time, 30 minutes to recharge.

Other recommended battery-operated mowers are:
GreenWorks G-MAX PRO 80-Volt Electric Lawnmower
Yard Force 120V 22-inch Cordless Electric Lawn Mower
Snapper XD 82-Volt Self Propelled Cordless Mower
Snapper XD Mow 21-inch Cordless Lawn Mower
EGO Power+ 20-inch Cordless Mower
Black+Decker MM2000

Which ever model you choose you are going to get good results, a quieter, more peaceful environment for your clients (these mowers sound like a floor fan, very quiet, no need for hearing PPE!) and also do your part to be 'greener', something we all need to consider for our future generations. You can reduce your carbon footprint in regard to emissions and I guarantee your clients / guests will love these quiet green mowers. In my humble, earth honoring, aloha 'aina opinion battery operated mowers are "a great way to go and mow!"



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Photo of Chinatown with the old Kaumakapili Church. The Bubonic Plague caused devastation right here in our own Chinatown. Controlled fires were set, buildings disinfected, garbage burned, and cesspools filled. On January 20, 1900 a fire was set on Beretania Street between Nu'uauu and the old Kaumakapili Church. Photo Credit: Historical Photograph provided by: Vince Sortino

The History Of Landscape Architecture

Our Stories Of The History of Landscape Architecture In Hawai'i - Part XI

By: Dana Anne Yee, FASLA, ISA CA, LEED AP, RA, MG All photos by Dana Anne Yee

LOCUST, FLEAS, BEETLES, ANTS, AND BUGS, OH MY!

This may seem like it has nothing to do with landscape architecture but, in reality, it has everything to do with landscape architecture. Invasive insect species have created havoc in the world for a long time. Landscapes that are designed with plants and the care of plants have been paramount to creative designs, grand open spaces, and beautiful landscapes in the world and they can all come to an end with an invasion of insect pest species.

This may seem like it has nothing to do with landscape architecture but, in reality, it has everything to do with landscape architecture. Invasive insect species have created havoc in the world for a long time. Landscapes that are designed with plants and the care of plants have been paramount to creative designs, grand open spaces, and beautiful landscapes in the world and they can all come to an end with an invasion of insect pest species.

Locusts have caused devastating plagues. Locusts have been recorded to cause a devastating plague as far back as 203 BC in Capua, Italy. In 311 AD, Locusts were the cause of 98% of the deaths to humans in the northwestern provinces of China. In 1722 Jesuit Missioners in California recorded a plague. And in 1874 it was called "the Year of the Locust", as the locusts covered the sky and damaged crops to the great plains and caused farmers to migrate.

When the conditions are right (drought followed by rapid vegetation growth) Serotonin in the Locust's brains trigger a dramatic set of changes and they start to breed abundantly. Swarms of the winged adults cause massive damage to crops. <https://en.wikipedia.org/wiki/Locust>

Fleas infected with *Yersinia pestis* bacterium were the cause of the Bubonic Plague also known as "Black Death" in the 14th century. The bacteria, enters the skin through a Flea bite traveling to a lymph node where it replicates out of control. Rats serve as host for the fleas. And the plague is also caused by handling of infected animals. The Bubonic Plague is believed to have originated in China in 1334, spreading along the great trade routes to Africa and then Europe. The Bubonic Plague killed an estimated 50

million people, 25% to 60% of the European population.

HERE IN HAWAII

The Bubonic Plague caused devastation right here in our own Chinatown around 1899. "... dilapidated and flimsy wooden structures plagued by poor sanitation, periodic flooding, dense living conditions, and rat infestations" described Hawaii's Chinatown.

<http://www.hawaiihistory.org/index> Rats carrying fleas infected with *Yersinia pestis* bacterium was the cause of the Bubonic Plague. Quarantine stations were opened in Kaka'ako by the Board of Health to isolate the infected people. A line was drawn that no one infected could cross. Controlled fires were set, buildings disinfected, garbage burned, and cesspools

filled. On January 20, 1900 a fire was set on Beretania Street between Nu'uauu and the old Kaumakapili Church. On this windy day the fire escaped and spread to the wharf. The fire burned for 17 days, burning 38 acres and 4,000 homes of mostly Chinese and Japanese people. More controlled fires were set and after four months Honolulu was free of the plague.

Ambrosia Beetles are the cause of the spreading of the Ceratocystis fungal disease to the 'Ōhi'a Lehua Trees, *Metrosideros polymorpha*. This devastation to our valuable native Hawaiian Tree is known as the Rapid 'Ōhi'a Death or ROD, because the 'Ōhi'a Lehua Trees die very quickly. J.B. Friday, Extension Forester, reported at the CTAHR Invasive Species Conference held in Hilo, Hawai'i,

in August 2019 that 175,000 acres show signs of the fungi *Ceratocystis lukuohia* and *Ceratocystis huliohia*. 'Ōhi'a Lehua Trees have been infected on Hawai'i Island, Kaua'i, and just recently in the summer of 2019 on O'ahu. Maui had a single 'Ōhi'a Lehua Tree infected but it was removed and the infestation was eradicated. The Ambrosia Beetles are attracted to injured or sickly 'Ōhi'a Lehua Trees. ROD is either blown in by wind to the injured tissue of the trees, or Beetles that have picked up infected spores from infected plants, facilitate the transfer to the new 'Ōhi'a Lehua Tree hosts. The beetles bore into a tree and then to the sapwood of the 'Ōhi'a Lehua Trees and create a fine dust, which gets mixed with *Ceratocystis* fungal spores. The spores are generally carried by the wind, or the transport of the 'Ōhi'a Lehua wood, or the feet of four legged animals (undulated animals) such as pigs or goats or even on the bottom of the shoes of a person.

'Ōhi'a Lehua Trees are endemic to Hawai'i and they are the dominate species of native forests where they provide food and shelter to other native organisms and at the same time slow erosion and filter water in the watershed. Kaiser, B., N. et.al. (1999) estimated the value of O'ahu's Ko'olau forests at \$14 billion. Rapid 'Ōhi'a Death, is spreading at an unprecedented rate on the Hawai'i Island. It is easily dispersed in windborne Beetle Frass, and it has the potential to wipe out Hawai'i's 'Ōhi'a Lehua Trees. Without the 'Ōhi'a Lehua Trees the forest the watershed will be devastated. The loss of 'Ōhi'a Trees will diminish the forest canopy creating openings in the forest and opportunities for soil erosion and introduced invasive plants and trees may gain a foothold in the pristine native forests. Our Hawai'i will lose an important native habitat for our flora and fauna.

According to Dr. Friday there are 180,000 acres of infected 'Ōhi'a Lehua Trees. More than 1 million trees have been killed by the disease so far. And it is estimated to cost \$20,000 to \$30,000 per acre to restore the forest.

Naio Thrips were first discovered on Hawai'i Island in 2009 and they have now found their way to O'ahu in 2019. They are very tiny insects that have asymmetrical mouth parts used to rasp and suck plant juices. They have wings resembling feathers. The Naio plant can be found on coastal dry forest areas up to mid forest elevation areas. They may have arrived to Hawai'i from California or Australia.



Historical photograph of Chinatown.
Photo Credit: Historical Photograph provided by: Vince Sortino

I have planted these beautiful, easy to grow, native Naio plants extensively in my landscape projects I will miss them, so I hope that they find a solution to prevent the continued decimation to our native Naio plants.

Coconut Rhinoceros Beetles have the potential to destroy more than 40% of Coconut Palms in a given area. This would be the loss of 1,600 (of the approximately 4,000) Coconut Palms in Waikiki alone.

Fire Ants insect pests have already reached our shores. The little fire ants are estimated to cost Hawai'i County \$174 million per year in management costs and economic damage to agriculture, nurseries, residents, and other sectors (Motoki, M. et. al., 2013).

Termites cost \$150 million per year to exterminate and to repair their damage to our structures (Hawai'i Department of Agriculture, et. al., 2016).

Coffee Bean Borer causes a loss in production of coffee beans.

Macadamia Felted Coccid attacks Macadamia Nut Trees and cause losses in production. This is another major pest.

Small Hive Beetle causes the loss in honey production and weakens the hive. The weaken hive allows other pests to come in which cause the hives to die. The small Hive Beetle are reducing yields of honey.

Varroa Mites are external parasites that attack honey bees by sucking the blood from the adults and the brood, causing the decline of honey production. EEE Eastern equine encephalitis is a mosquito born illness. It is a rare deadly virus that has no cure and no vaccine. It occurs in the east coast from a bite from an infected mosquito. The virus has recently taken 9 lives in the mainland.

Two-lined Spittle Bug which was detected in 2016, is killing pasture grass by adult bugs feeding on the grass. Feeding on the grass blocks photosynthesis and this ultimately kills the grass. They come from North America. They suspect big box store nurseries brought them to Hawai'i. It affects 126,000 acres on Hawai'i from Hualalai to Keokea. The cattle industry in Hawai'i occupies the most land used in Agriculture, an estimated 1 million acres, and it is estimated to cost \$68 million a year in losses. 60% of the cattle comes from Hawai'i Island. There is no demonstrable solution yet as reported by

Shannon Wilson, graduate student from the University of Hawai'i, who gave a talk at the Invasive Species Conference in Hilo Hawai'i, in 2019.

The establishment of an insect vector (mosquitos, black flies, sand flies) and its associated serious disease (e.g. dengue fever, hemorrhagic fevers, malaria, river blindness, zika etc.) in our residential population could lead to outbreaks which could infect tourism, who in turn would shun Hawai'i leading to serious repercussions to our economy. (Remember the Rio Olympics in Brazil and the Zika Virus).

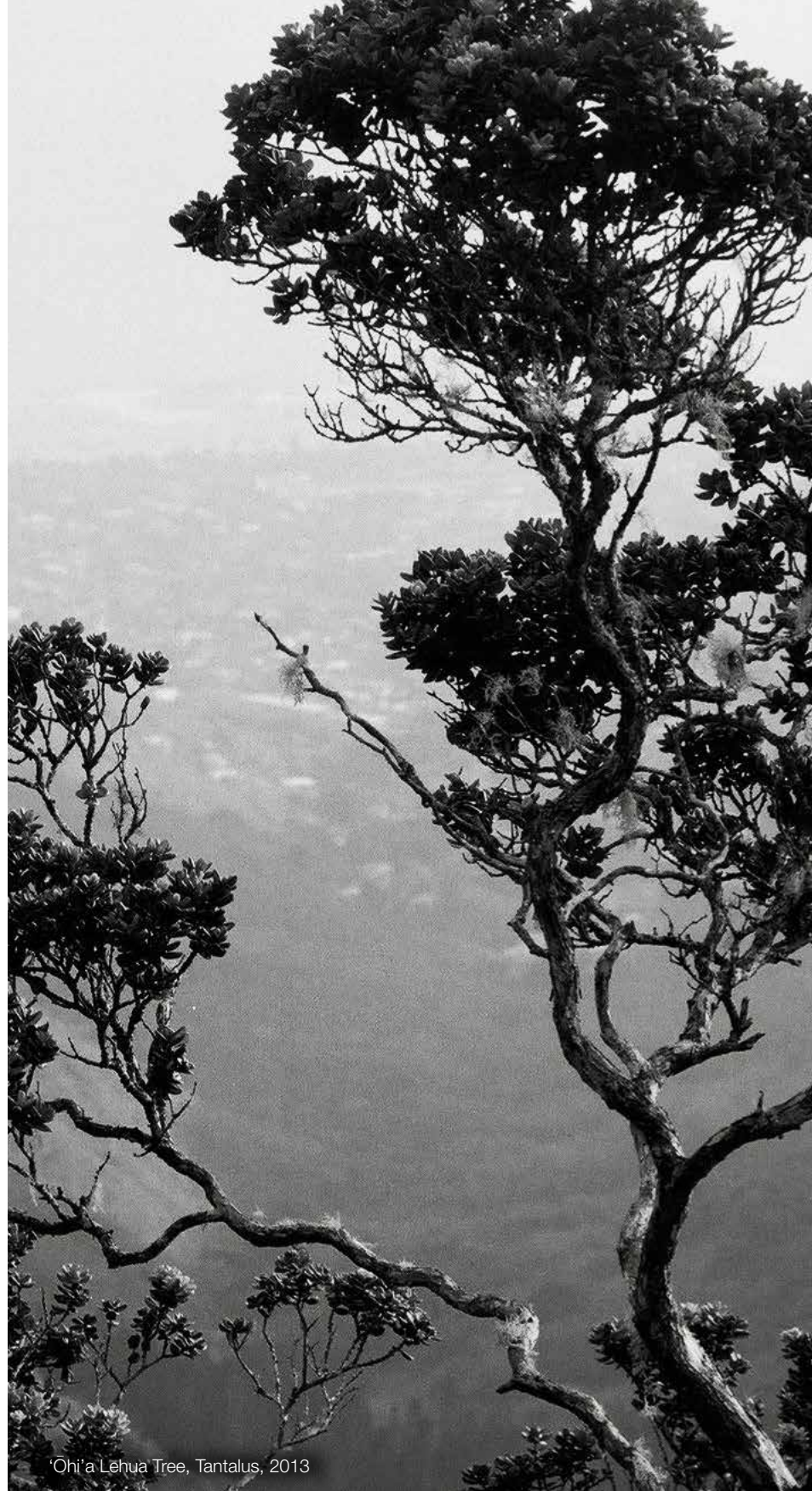
HISTORY LESSON:

This historical lesson is taking us way back in time. Fossil records show that the first arthropods were present in the oceans about 550 million years ago. They invaded land around 420 million years ago. Insects appeared around 400 million years ago and 200 million years ago all major living groups of insects (beetles, butterflies, moths, flies, etc.) were present on the planet.

Great changes have continuously taken place across Hawai'i in last 240 years.

On average, about two dozen insects new to the islands are discovered every year. Most are harmless but major pests become established every couple of years or so. Many of these changes have been good and many have been bad. New people introduced and continue to introduce new cultures and new plants and animals to Hawai'i. Many of these new introductions have smoothly assimilated while others have not. Some purposely introduced plants and animals as well as some inadvertently introduced hitchhikers are counterproductive to our way life. We call these "invasive species". Invasive insect species are insects that transmit diseases to us, to our pets and to our livestock, cause disruptions in our crop production, and upheavals in our natural environments. In Hawai'i, invasive insects are estimated to do hundreds of millions of dollars in damage per year. Once a pest insect becomes established it is often very difficult or even next to impossible to eradicate. There is no going back. Therefore, the best time to get rid of a pest, once it gets through quarantine, is while it is in the earliest stages of a new invasion, while its population numbers are low and its geographical footprint small, and before it can disperse.

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'Ohi'a Lehua Tree, Tantalus, 2013

THE EARLY DETECTION OF INVASIVE INSECT PEST SPECIES:

The Dana Anne Yee Foundation, a non-profit, 501(C)(3) organization is working diligently on the Early Detection of Invasive Insect Pest Species to help to preserve and protect our green Hawai'i. Thanks to the kind support and generous donations from the Atherton Family Foundation and many of our caring Hawai'i protectors we have been able to survey for invasive insect species on our islands. We are thankful for the generosity of our Green Industry, such as the Atherton Family Foundation, O'ahu Nursery Growers Association, Scenic Hawai'i, Inc., Landscape Association of Hawai'i, the City and County of Honolulu, the Dana Anne Yee Foundation, and many private donors, Karen Li (NY), Fook Hing and June Li (HK), Leslie Dean, Dawn Easterday, Maile and Ronald Goo, Tammy Hasegawa, Steve Montgomery, Steve Nimz, Richard Nishida, Richard Quinn, Trophy House, Derek and Angela Yee, Harry and Jeannie Yee, Tricia Yee, and Rick Benedict with Beachside Lighting. They have all generously and kindly donated to our surveying work and they are all instrumental in helping to keep our Hawai'i Green. The donations have also helped provide two valuable steel research learning insect cabinets for our keiki and kūpuna at the University of Hawai'i O'ahu Urban Garden Center.

The Dana Anne Yee Foundation has been successful in finding many newly arrived insect species to the islands since its inception in 2016. Here are six of the many newly discovered immigrant species that we have collected in Hawai'i:

1. *Scolopendra morsitans*, a centipede, was found in the coastal areas on O'ahu. It is new to the state of Hawai'i. It was published by Dr. Roland Shelly and William D. Perreira (also the collector) in 2014. The centipede bites and it has a mild venom. It has medical and veterinarian importance.
2. *Tylopterna sp.*, a fly, was found on O'ahu. It is a new State Record to Hawai'i. It was published by Dr. Neal Evenhois and William D. Perreira (also the collector) in 2018. The male of the species has a flattened face and the insect has shown not be harmful.
3. *Deraeocoris orientalis*, a plant bug, was found on O'ahu and Maui. Is was published by Dr. Thomas Henry and William D. Perreira (also the collector) in 2017. It is a new State Record to Hawai'i. It is a predatory species that may prey on pest species.

4. *Paraxis yeei*, a leafhopper, was found on O'ahu. It is a newly discovered species to science and the state of Hawai'i. It was published by Dr. Chris Dietrich and William D. Perreira (also the collector) in 2019. It is not known to be harmful.
5. *Eupteryx decemnotata*, is a Ligurian leafhopper. It was published by Dr. Chris Dietrich and William D. Perreira (also the collector) in 2019. It was first found at Foster Botanical Gardens on O'ahu in 2017 and subsequently it has been collected on Maui and Hawai'i Island. It was originally from Europe. It is a green camouflaged winged leafhopper. It attacks Rosemary plants.
6. *Idona minuendo*, is a white winged leafhopper, that was found at 'Iao Valley, Maui and Hawai'i Island. It was published by Dr. Chris Dietrich and William D. Perreira (also the collector) in 2019. It has black spots on white wings and was originally from the Americas. It attacks Avocado plants.

And many other introduced insect species have been found by our foundation and many more are arriving and causing havoc and destruction to our beautiful islands.

DANA ANNE YEE FOUNDATION, 501(c)(3): is made up of Board of Directors and Members that are dedicated, talented, and skilled professionals from many fields of study. Peter Thompson, Lillian Rodolfich, Nancy Miller, Stephan Doi, Rachel Katzman, Angelica Rockquemore, and Carol Hopkins. We are all committed to protect and preserve Hawai'i's Green Environment.

I am thrilled that Our Stories of the History of Landscape Architecture in Hawai'i received a 2018 treasured Design Award of Honor in the Research and Communications category from the American Society of Landscape Architects Hawai'i.

I will be compiling stories and information on our recognized Landscape Architects and our treasured open green spaces. I have contacted many of you and if you have any stories, photographs, or want to share your experiences of Landscape Architecture in Hawai'i, please email them to me or give me a call. Thank you for your continued support of Landscape Architecture in Hawai'i.

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By Dana Anne Yee, FASLA, ISA CA, LEED AP, RA, UH MG, from the firm of Dana Anne Yee, Landscape Architect, LLC.

(www.danaanneyee.com). Dana has been a presence in the Landscape Architectural profession and has a long standing pattern of service to her profession and the community. Dana was honored as a Fellow with the American Society of Landscape Architecture in 2012. The Dana Anne Yee Foundation, (www.dayifoundation.org). (dayifoundation.wixsite.com/blog) is a 501(c)(3) non-profit organization. The board of directors and members will continue in their commitment to serve to protect Hawai'i's delicate ecosystem and natural environment in their pursuit to preserve Hawai'i's beauty and to keep our Hawai'i green.

Susan Owen
Manager
Contact (808) 239-1280 Office
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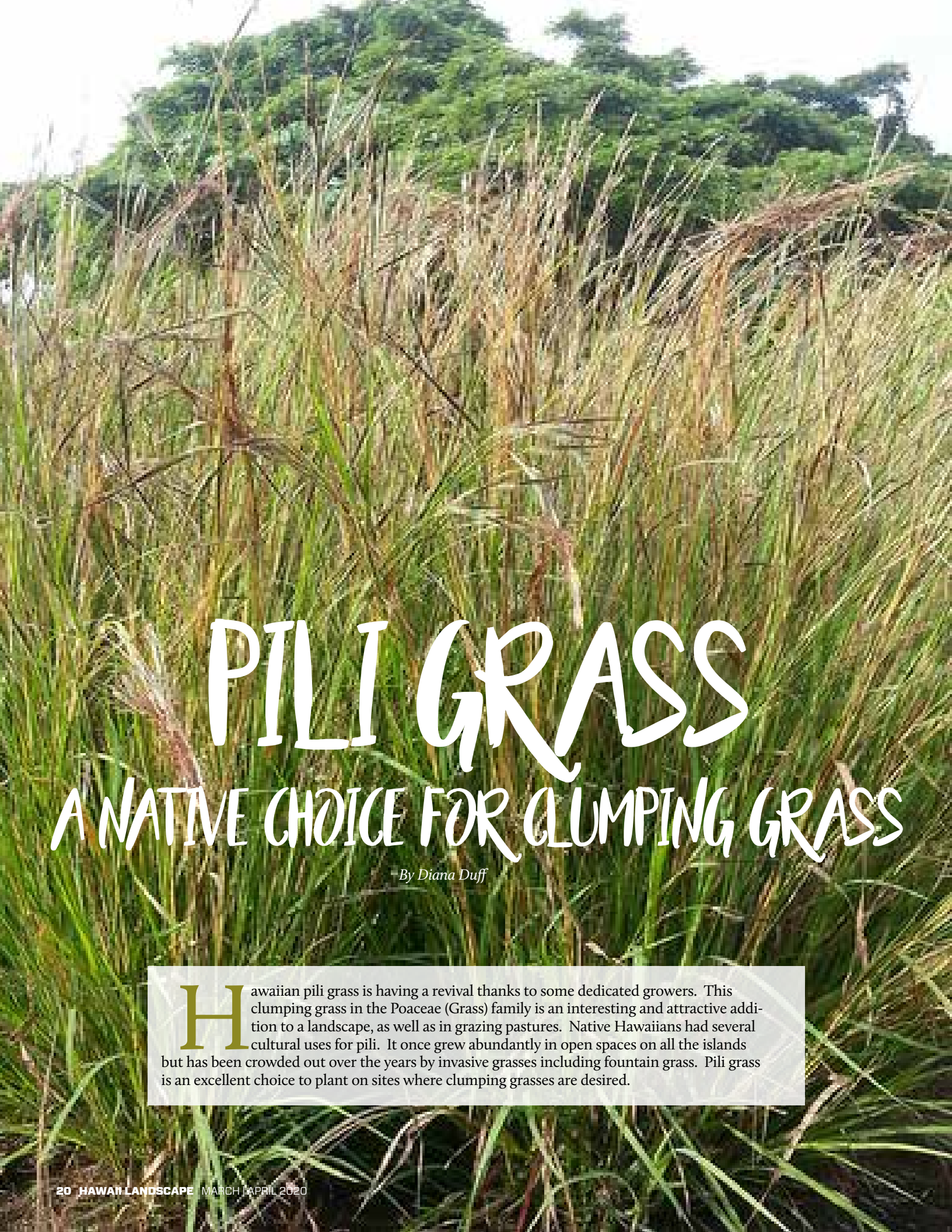
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PILI GRASS

A NATIVE CHOICE FOR CLUMPING GRASS

By Diana Duff

Hawaiian pili grass is having a revival thanks to some dedicated growers. This clumping grass in the Poaceae (Grass) family is an interesting and attractive addition to a landscape, as well as in grazing pastures. Native Hawaiians had several cultural uses for pili. It once grew abundantly in open spaces on all the islands but has been crowded out over the years by invasive grasses including fountain grass. Pili grass is an excellent choice to plant on sites where clumping grasses are desired.

Pili (*Heteropogon contortus*) is one of 80 grass species that are native to Hawaii. Many others are endemic, which means they are not native elsewhere. It is quite possible that pili grass was brought to Hawaii by early Polynesian settlers but it is more likely an indigenous grass since it is native in many other tropical locations as well. Today it is widely naturalized in tropical and subtropical regions of the Americas, East Asia and throughout the Pacific. It is sometimes known here by the English name tanglehead referring to the tendency of the mature seed heads to bunch up or tangle.

Pili's genus name *Heteropogon* is derived from the Greek word *heteros*, meaning different, and *pogon*, which means beard. This name refers to the growth pattern of the seed heads. The species name *contortus* is a Latin word that refers to the pili seeds' unusual habit of contorting when wet in order to burrow into the soil. In Hawaiian the name pili means "to cling or stick," again referring to the shaft whose corkscrew shape can burrow into soil as well as fur, feathers and clothing.

Pili grass is an herbaceous, tropical, bunching or tussock grass that is a perennial here in Hawaii. Mature clumps of erect pili are usually 2 feet or more high and have a 2 to 5 foot spread. A more prostrate variety usually stays low at 12 inches or less. The leaves of both types are coarse and tough and produce small insignificant brownish or white blooms throughout the year. These inflorescences develop into the dark brown seed heads of pili grass.

Pili seeds are tipped with sharp spikes that help them burrow into the soil where they land. In dry conditions the spikes have a corkscrew-like twist. In moist conditions they straighten and to be capable of drilling the seed into the soil to germinate. The erect type of pili grass reseeds itself prolifically, but the prostrate type needs to be propagated by root division.

Pili is somewhat similar to fountain grass in that fire is a useful tool in managing large stands of the grass. Unlike fountain grass, pili seed germination is not encouraged by fire, but burning is used to create open space for the seedlings to establish themselves.

Growing pili from seed in cultivation requires patience as two dormancy

periods can stall germination for up to 12 months. To become viable the seeds need to be stored for six months or more. Once planted they may take a few months to produce seedlings. Though the plants reproduce from seed well in the wild, gardeners may prefer to take root divisions from existing plants to acquire new clumps. Taking divisions for new plants annually is a good idea as the life span for a pili grass clump is about 5 years.

Pili grass is a hearty ground cover that grows best in full to partial sun in soil that drains well. Spacing the clumps closer than 2 feet will encourage tall growth. Pili grass is drought tolerant, and can tolerate wind, salt spray and high heat. It can survive with very little water or fertilizer and needs almost no care or attention.

Annual pruning can be done to encourage new growth. Cutting the grass tops will trigger new green shoots to grow. Pili is occasionally subject to attacks by scale, mealy bugs, aphids and thrips but is generally pest free. If or when insects appear, they can often be controlled simply with a combination of soap and oil in water.

Early Hawaiians developed several uses for the pili grass, which was once plentiful on all the Hawaiian Islands. They often used the ash from burned pili grass for dyeing tapa cloth as well as in some medicinal remedies. It was also the primary grass used to thatch roofs for its brown color, neat appearance and pleasant odor. The thatching was replaced every four or five years. Bunches were harvested and trimmed then tied close together with *ukiuki* grass in rows with stems up starting at the bottom of the frame and working upwards. The grass also lent itself to use for flooring, in mattresses and other padding. The English name "grass shack" probably referred to the grass-covered structures that the colonists found here.

The attractive and hearty stands of pili grass here in Hawaii served as models for restoring the Great Plains' grasslands and prairies in parts of the US mainland, especially where growing conditions suited pili. It has also been used in conservation efforts here in the islands, including in replanting projects on Kaho'olawe and as a roadside grass to replace invasive species like fountain grass. Where the grass was plentiful, many other uses were developed.

Pili grass is a terrific accent plant,

especially in native Hawaiian gardens. It can also serve as a hedge or simply as a ground cover to control erosion. Though basically a xeriscape plant, pili is usually greener and more attractive when it receives regular watering and occasional nitrogen fertilizing.

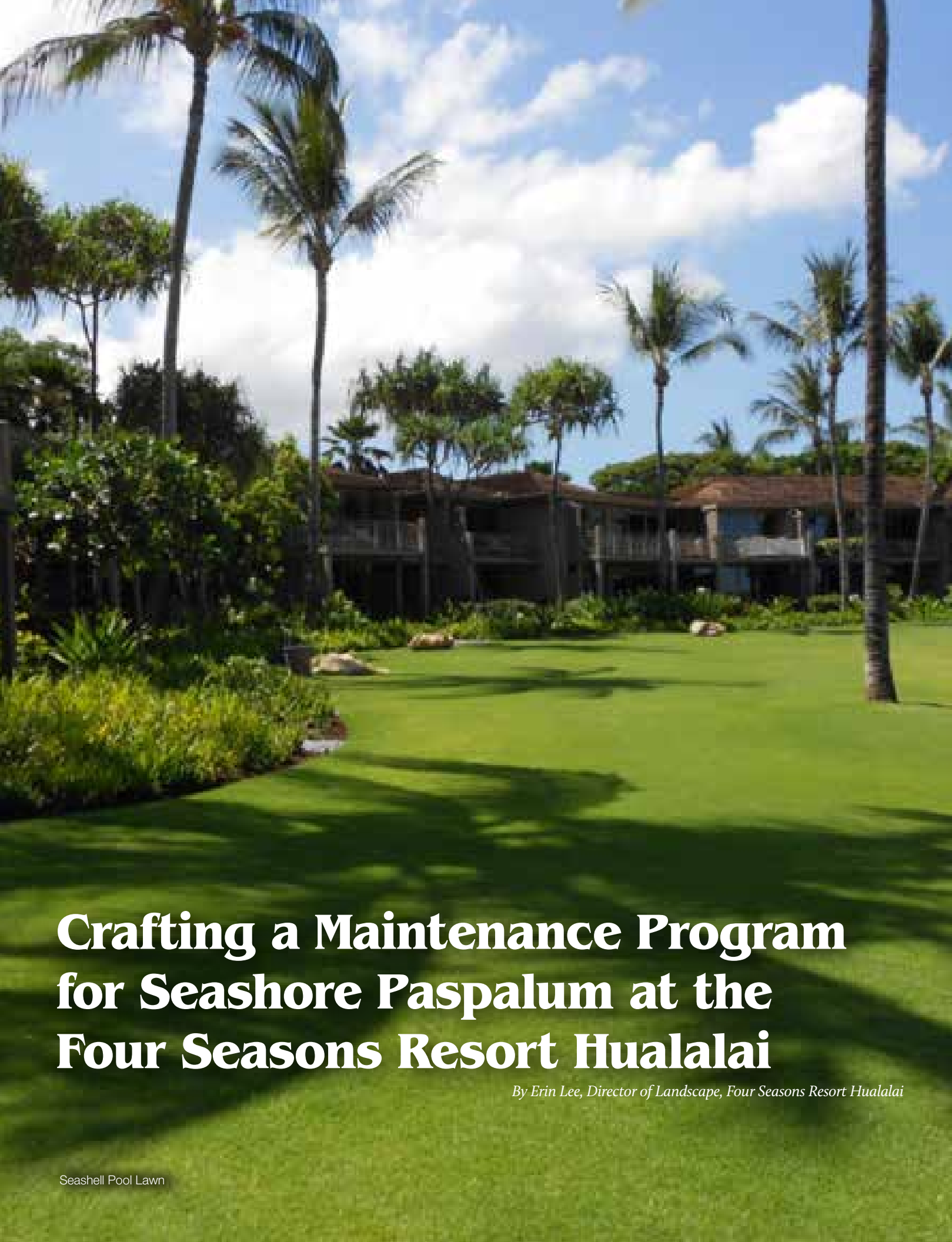
Pili grass has been grown at the Ho'olehua Plant Materials Center on the island of Molokai for NRCS reforestation projects. Plants may be available through them. The State Tree Nursery in Waimea and Amy Greenwell Garden in Captain Cook often have plants for sale as well.

Local grower and pili specialist, Angelica Stevens is cultivating pili grass on her farm and encourages other farmers and gardeners to use it for weed control as well as for soil and water conservation. You can contact her for information on the use of pili in garden and farm settings at homeokahalu@gmail.com.

If you are looking for clumping specimen plants, grassy edging or row dividers or simply want to use and work with native Hawaiian plants, pili grass should be added to your plant list.

Diana Duff is a local organic farmer as well as a plant advisor and consultant.





Crafting a Maintenance Program for Seashore Paspalum at the Four Seasons Resort Hualalai

By Erin Lee, Director of Landscape, Four Seasons Resort Hualalai

Seashell Pool Lawn



Verticutting with the Electric Eclipse mower at the Beach Tree Lawn



Core aerification at Palm Grove Lawn

I am the first to admit that even though I have been a landscape manager for over 20 years, turf management is not my strong suit. Fortunately, my partners in Resort Landscaping and Golf Course Maintenance are some of the most knowledgeable turf managers in Hawaii.

After the tsunami in 2011, the hotel changed all of the turf on its 35-acre footprint from Tifway II Bermuda to Seashore paspalum 'Salaam'. Pre-renovation, the Bermuda suffered in quality under the constant traffic and demands of our very busy resort. It could never mirror the beautiful smooth greens and fairways

of the Hualalai Golf Course, just on the other side of the walking paths. I recall the debate that ensued over introducing paspalum to the resort because of the golf course; paspalum would inevitably invade the Bermuda and become an aggressive turf competitor. At the time, we were constantly struggling to kill it along our community roadways where independent landscape companies had inadvertently introduced it. But in the end, paspalum won the argument over Bermuda in the hotel.

Fast-forward to 2020. The lawns within the hotel and resort grounds are no longer a source of complaint for the

landscaping department. Since 2011, John Palos, Hotel Landscape Manager and his team of nearly 20 gardeners keep the turf areas at their best by following an annual regimen of cultural practices. We core-aerate annually followed by an application of gypsum and a top-dressing of silica sand. Ideally, we verticut or dethatch at the same time. Both practices provide many benefits such as preventing hydrophobic conditions; increasing drainage; relieving compaction; reducing conditions that cause diseases like fairy ring and brown patch; and reducing habitat for fungus gnats.



Mowing frequency and mowing height are critical to keeping up with the growth of Seashore paspalum. In the spring, just as the growing season begins, we mow twice a week using an Eclipse electric reel mower. John uses a one-third rule clipping rate where the measurement of the clippings should be one-third of the height of cut. For example, if you mow at 1" and your clippings are more than ¼", then your mowing interval needs to be shorter. As a rule, the shorter the height of cut, the more often you need to mow. During the winter months here in Kona, due to the shorter days from November through January, we reduce our frequency of mowing to once a week or every two weeks. Paspalum requires deep and infrequent watering and it is not a drought-tolerant species of turf. For our maintenance schedule, we turn off the

irrigation to all lawns the night before so they are dry when we mow.

Once established, weeds in paspalum are very difficult to control because there are few chemical products labelled for it. Furthermore, paspalum is sensitive to chemical control, exhibits phytotoxicity and takes a long time to recover. We rely on rock salt or pool salt for most of our weed control. John's advice for controlling nutgrass: start with clean soil; know your source and don't let it come in as it is very difficult to get rid of once it invades your turf. The most common paspalum turf grass weeds are prostrate spurge, goose grass and green kylinga.

We fertilize paspalum turf with 21-0-0 using no specific calendar or schedule. Our rule is to feed as little as possible and to apply it according to its color and clip rate. The key to managing paspalum

turf at the highest level is keen observation and an understanding that it is a living organism which has its own unique needs and interactions within the overall environment. Our Resort's unique shoreline location and proximity to the ocean can be a challenge for landscape maintenance and plant survival in general as we see firsthand, the rising level of the ocean. But, the seashore paspalum lawns along our oceanfront have now endured years of winter surf, king tides and sand inundation, not to mention the scores of guests on chaise lounges, flag football games and special events. I can't even imagine how we would have been able to achieve the visual beauty of our resort lawns if it hadn't been for that benchmark decision in 2011 to change it to seashore paspalum.



**PESTICIDE
CORNER**

BY: RUSSELL GALANTI

Office of Pesticide Programs Update



EPA finalizes Glyphosate mitigation

EPA has concluded its regulatory review of glyphosate—the most widely used herbicide in the United States. After a thorough review of the best available science, as required under the Federal Insecticide, Fungicide, and Rodenticide Act, EPA has concluded that there are no risks of concern to human health when glyphosate is used according to the label and that it is not a carcinogen. These findings on human health risk are consistent with the conclusions of science reviews by many other countries and other federal agencies, including the U.S. Department of Agriculture, the Canadian Pest Management Regulatory Agency, the Australian Pesticide and Veterinary Medicines Authority, the European Food Safety Authority, and the German Federal Institute for Occupational Safety and Health. The agency is requiring additional mitigation measures to help farmers target pesticide sprays to the intended pest and reduce the problem of increasing glyphosate resistance in weeds.

Glyphosate has been studied for decades and the agency reviewed thousands of studies since its registration. Glyphosate is used on more than 100 food crops, including glyphosate-resistant corn, soybean, cotton, canola, and sugar beet. It is the leading herbicide for the management of invasive and noxious weeds and is used to manage pastures, rangeland, rights of ways, forests, public land, and residential areas. In addition, glyphosate has low residual soil toxicity and helps retain no-till and low-till farming operations.

More information on glyphosate and EPA's interim decision is available at:
www.epa.gov/ingredients-used-pesticide-products/glyphosate

Background

EPA uses interim decisions to finalize enforceable mitigation measures while conducting other longer-term assessments, such as an endangered species assessment. EPA will next complete a draft biological evaluation for glyphosate, which is anticipated for public comment in Fall 2020.



Perennial Grassy Weed Patrol Article



Zero Emissions



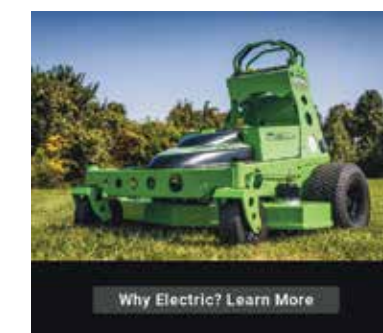
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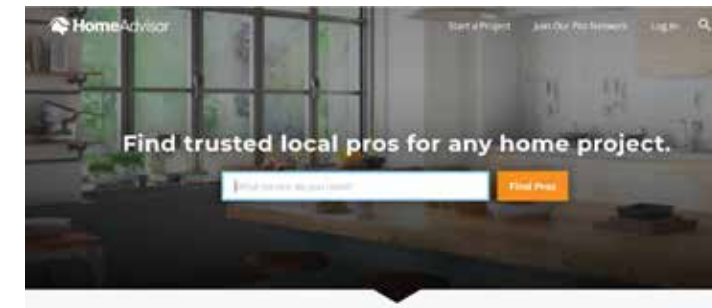
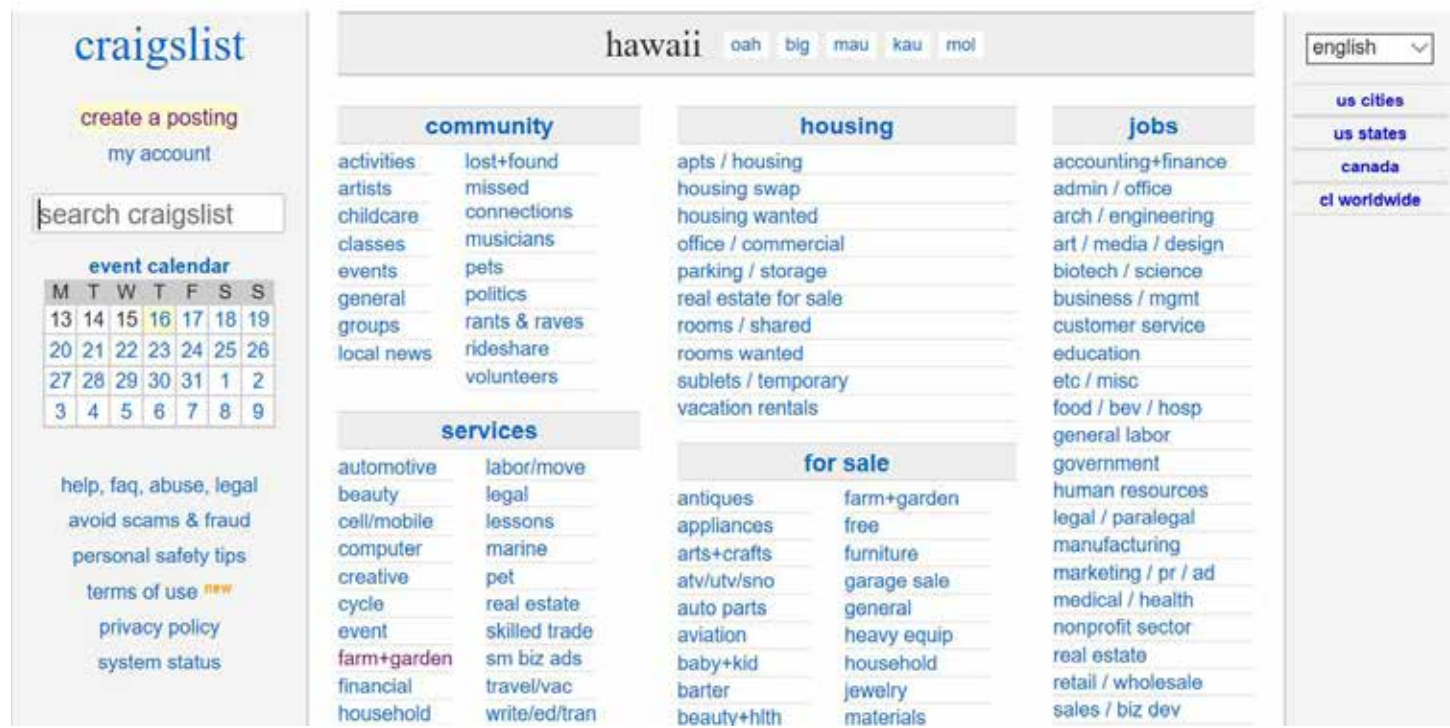


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4 Company's Specialization: *Required Field _____

5 How many full-time and part-time employees in your company?

- 1 to 10
 11 to 25
 26 to 50
 50 to 100
 101+

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