

Planting in Crooked Lines

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In Hoolehua, there's a lot of room to plant in crooked lines.

As farmers, we've been taught to plant crops in straight lines. There's a row to walk down or to run your tractor down so you can perform your field work more efficiently. And that's why they're called row crops.

It seems we walk in straight lines more often in the city, but at home on Molokai I seem to walk in more crooked lines. That's except when I'm shopping or walking down rows in my banana field.

Insects just love straight lines. We've modified the environment to their advantage first by limiting the diversity of the landscape, then by planting in straight lines making it so much easier for them to jump from one plant to the next and not miss a step. We also make it easier for pests to raise their progeny by creating 'apartments' for them. Birds

just love straight lines, especially in a just planted field of beans or corn where they can hop, skip, and jump to the beat of the seed spacing.

In my high school, we were taught to stand in straight lines so we looked neat and organized, and generic, but is being out-of-line such a bad a thing? And is conforming and being orderly the way of the world?

I think problem in society today is that we lack creativity and don't think outside the box. We become same old, same old. In school, our children are taught not to question the teacher, and to just listen, believe, and conform. By doing this, we stifle creativity and initiative in them and before you know it, we have the next generation of conforming robots waiting to be taken over by some crazy zealot or despot.

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Being organized and orderly can be an obsessive behavior much like wiping every surface with a

Clorox wipe before touching it for fear of

catching the Ebola virus. We become sterile and lack creativity, which is not a good thing.

Today, DIVERSITY is the name of the game. Sustainability is status quo and is becoming stale, but diversity is all of us and more. Diversity makes the world go round, not like robots that look and act the same.

Diversity makes Hawaii, New York, and San Francisco standouts as melting pots with an array of stews and soups of different cultures. Appreciating and celebrating our diversity is what it's all about. It makes life interesting, and well, diverse. It's about doing something different and tasting something different all the time, and variety IS the spice of life.

With diversity comes resilience, one of my favorite words these days. It reminds me of other adjectives such as wiry, tough, and flexible. Some farmers are catching on to this concept, especially as it relates to the soil web and how it affects soil health, and also balance in the above ground environment. It's about fostering this diversity and not destroying it through your everyday actions as farmers such as rototilling, ripping, and disking too much.

Speaking of diversity, I often reflect on the Hawaiian garden. What is the Hawaiian garden? This is how many of us in Hawaii plant our back yards, but it's something that's disappearing because people cannot afford to have a backyard.



Honolulu Star Bulletin.

How many mango trees can you find in Kapolei? Not too many for a lot of reasons including small lots, and even covenants preventing the planting of large trees. But just visit Kaimuki, Aiea, Moiliili, Manoa, and many old communities in the state and that's where you'll find mango trees among many other large trees.

You could tell the ethnicity of a resident by the kind of plants in their yard, and to a large extent, you can still do this until they sell the house to someone of a different ethnicity.

The Hawaiian garden is where you find a diversity of utility plants such as avocado, oranges, jabon, lemons, tangerines, sour sop, kalamungai, bittermelon, ulu, kukui, plumeria, pakalana, puakenikeni, ti, taro, orchids, mountain apples, and mangos. And the list goes on and on.

When I was in intermediate school, my five brothers and I, and my two cousins who lived next door used to deliver newspapers. Eight of us had a lock on

the newspaper delivery profession in Manoa Valley. We delivered the Japanese language newspaper, Hawaii Hochi, and also the Honolulu Star Bulletin throughout the entire valley, from the main traffic light in Manoa at the intersection of Oahu Avenue and East Manoa Road all the way to the mountains and the ends of all the roads.



Beating the birds to a Bacon avocado

Aside from free tickets to the movies, usually the former Palace Theater on the corner of Keeaumoku and South Beretania Street, the greatest employment benefit was having access to a diversity of fruits. We knew where all the good fruits were and when they were ready to harvest, and harvest we would after we finished delivering our newspaper routes.

We would fill our newspaper bags with fruits such as mountain apples, mango, avocado, oranges, and many others. We would scout out the trees in the valley and GATHER THE FRUITS on our way home.

At that time, we didn't understand how we were benefitting from diversity,

especially soil diversity. These trees grew without a lot of care other than an occasional pruning, if at all, and it rained every morning and evening to keep them nourished.

What we couldn't see is what was happening underground. This Hawaiian garden was mimicking the forests behind the valley with its diversity of microbes maintaining a higher order in the soil food web. No one microbe was getting out of hand and causing trouble; everyone was behaving and contributing to the system and even benefitting from mutual symbiosis. This diversity is lost sometimes when we disrupt this balance by planting in straight lines and creating monocultures. To a certain extent we can bring this back by implementing well thought out rotation systems to reintroduce diversity into our farming system.

We still have a lot to learn from this system in how we farm and also act in society, and how we nurture our land.

But be on the lookout for those newspaper boys stealing those fruits from along your fence!

LIKE A GRASSHOPPER

In the popular television show, Kung Fu, Master Po refers to his student as 'Grasshopper', a term of endearment for one who is young, has a lot to learn, and whose mind jumps around *'like a grasshopper'*.

We probably have more to learn from the grasshopper than they can learn from us. Few other insects have caused greater direct loss to crops worldwide than have grasshoppers. From ancient times to now, grasshoppers have caused the death through famine of millions of human beings. Their damage is worse in areas with low rainfall when food is sparse. And we've been having our share of grasshoppers throughout the summer

Grasshoppers are difficult to control because they move quickly, sometimes in waves and will also multiply quickly. There are over 600 species of grasshoppers in the U.S., and over 8000 species worldwide. The most notorious of them all are the locusts, a type of grasshopper.

Young grasshoppers differ from the adults only by size and the fact that they can't fly. The ability to fly long distances makes grasshoppers especially destructive since they can migrate over a large area in a short time, leaving a path of destruction in their wake.

Once in an area, their large back legs allow them to jump around, hence the name grass hopper. They love to eat members of the grass family including grains and corn. Together with their wings and large legs, they can move faster than a human can walk or even run at times.

In parts of the mainland, they will live in fields adjacent to crops and wait for crops to emerge in the spring. Eggs are

laid in the ground in the fall in anticipation of the spring flush and crop plantings. One strategy farmers will employ is plowing fields before winter to disrupt egg laying activities.

In Hawaii, grasshoppers can be a year-round problem, but are especially troublesome after a wet winter when fields are flush with growth, and fields start to dry, such as now. There have been sightings of grasshoppers in Kalae and also in Hoolehua this spring and they're still causing problems today.

Most can be very difficult to control because they're polyphagous, or indiscriminate in their eating habits and will eat almost anything that resembles a green plant, although many species have their favorite foods.

One way grasshoppers are controlled in many parts of the world is by creating a demand for them as a food source, and is an important protein source in some countries.

In Mexico, they're captured at night using lamps, and scooped up in nets. They're prepared boiled, sun-dried, fried, and flavored with spices such as garlic, onions, chilipeppers, dipped in lime juice, and used in soups.

In China, they're served on skewers, and in the Middle East, grasshoppers are boiled in hot water with salt similar to soybeans and peanuts, and eaten as a snack. Tempura grasshopper in dipping sauce, or fried with garlic and

chili pepper water would be new options as well.

I recently received an inquiry from USDA about instances where residents eat insects. This option is being investigated as food gets scarcer, and coming up with innovative products and recipes is one way of staying ahead of food trends and starvation.

Flavors to Savor

I think the rest of the world needs to catch-up to Hawaii when it comes to flavoring food. We have a cornucopia of flavors from east that west that can be used to pepper our delicacies from land and sea.

Today, **HOT** is **IN** with old stand-bys such as Tabasco and Hawaii chilipepper water, as well as more recent additions such sweet chili sauce, sriracha, habanero, and ghost chili. The latest trend is combining hot and spicy, and also sweet with sour which has been around here for too many generations to count.

Ginger, another standard in Hawaii cuisine and an important ingredient for soups, teriyaki sauce, and more recently real ginger drinks are going main stream. A new combo is ginger and honey in bar-b-que sauces.

Chefs are also taking products already on the market, such as sweet ketchup,

and combining it with habanero or chipotle to make an easy sauce just like the way we combine stuff with mayonnaise such as mustard and wasabi.

Another natural combination is citrus, such as lime, lemon, or orange with heat, and some will combine cinnamon and even mango for a fruit and spice combination. Speaking of mango, blending it with habanero adds more depth and complexity to the sweet and hot.

There are unlimited types of chili each with their own nuances of earthy, smoky, fruity, hot, and spicy tones. Let's not forget garlic and shallots and onions, and even green onions, something we can't live without in Hawaii.



The real Hawaiian Chili is the size of a .22 bullet and rarely bigger. Watch for the imposters

Another truly Hawaiian taste is inamona or roasted kukui nuts, and there are so many ways to refine this product before adding it to a dish and can be used to baste poultry. It probably has potential for desserts as well. We already

combine it with hot chili and raw fish to make poke.

Wild new areas of food experimentation include hot and cold, such as Mango ice cream with a hint of cinnamon plus a blast of cayenne pepper. Another over the top idea is banana ice cream with Thai chili. Maybe we can combine it with banana lumpia as well.

The kind of chili you use and how you build on its flavor by grilling, smoking, poaching, sautéing or pickling can change both the complexion of the flavor and how it combines with other elements in a sauce or desert or main dish. The popularity of chipotle or smoke-dried jalapeno chili is opening the door to other smoked chilis.

Pickling of vegetables in Hawaii is not new and is built on many island cultures. Recent trends include adding pickled daikon noodles to sandwiches as in Bale Vietnamese Sandwiches, for example, but its uses are endless such as toppings for a main dish.

We've already been there and done that, such as adding kim chee to sandwiches and also fried rice. Fried rice is the universal local dish with unlimited combinations from sweet as in char siu to hot with kim chee.

Another example is adobo fried rice combining vinegar, bay leaves, and pepper with pork and fried rice. And let's not forget oyster sauce, which the world hasn't caught up to yet.

The other pepper or pepper corns are also taking off, including Szechuan pepper corns, white peppers, and also pink peppers made from Christmas Berry seeds, an invasive species in Hawaii, and a dominant tree in Hoolehua on Molokai.

Some of the up-and-coming trendy ingredients, most new to Hawaii, include the following:

- Harissa, a pepper sauce from North Africa.
- Gochujang, a chili peppers, rice, and fermented soybeans from Korea.
- Aleppo pepper powder, a chili from the Silk Road in Syria and Turkey.
- Za'atar, Middle Eastern Herbs containing Syrian oregano, basil, thyme, and savory.
- Hatch chili peppers from Hatch Valley, New Mexico.
- Shishito peppers from Japan.

On Molokai, we can grow and create most of these key ingredients, with the possible exception of oyster sauce, but give us time.

Inspiration for this article was drawn from the Culinology Newsletter, October 2014

Collard Greens

On Molokai, the summer heat can overwhelm many vegetables that grow well during the cooler months. Collards or collard greens can thrive at a time of year when local greens struggle and are in short supply due to the intense heat.

A primitive member of the cabbage family, *Brassica oleracea*, is further broken down into seven groups. Collard Greens belongs to the 'Acephala' group meaning 'cabbages without a head'. 'Collard' is a corrupted term from the word 'colewort' meaning 'wild cabbage plant'. Kale also belongs to this same group.

Native to the southern Mediterranean in an area called Asia Minor, a part of Turkey, it was carried in all directions and is popular in Portugal and Spain to the west, Bosnia, Montenegro, Croatia and Serbia to the east, and African and India to the south. The Spanish speaking countries call it Berza, while the Portuguese and Brazilians call it Couve, pronounced 'ku-vey'.



Collards enduring the intense Molokai summer

More heat-tolerant than its northern cousin kale, collard greens are a favorite of the southern U.S. introduced by African slaves, and an important part of their unique cuisine. Some collards are called kale, both known for their high nutritional, antioxidant and anti-cancer properties, but collards can be

distinguished from kale by their large rounded, cabbage-like leaves.

Like kale, collards can be grown as a perennial in Hawaii and enjoyed for years, while age will not affect its flavor. Like other cabbages, collards can be salted or even fermented like sauerkraut or kim-chee to preserve them. Collards fit into our local diet as an addition to stews, soups, saimin, and in stir fry dishes with bits of meat.

Collards contain calcium oxalate, an irritant to some of our organs, and should be cooked before eating to break down this compound. Calcium oxalate, implicated with kidney stones through the accumulation and cementing of calcium into small stones, are found in many vegetables including kale, spinach, beets, chard, and others. Taro is the extreme vegetable with high amounts of Calcium oxalate.

Collards are a durable plant but can face similar pests as its cabbage cousins, such as Aphids, Imported Cabbage Worm, and Green Garden Loopers, but can be controlled with organic insecticides such as *Bacillus thurengiensis* or Neem.

In wet areas, plants are susceptible to Black Rot or *Xanthomonas campestris*, a bacterial disease that can spread and maintain itself in plant material and seeds. Plant roots left in the field can take a long time to break down after harvest, so the disease will survive in the ground for over a year on plant debris. Removing the plant by its roots

after harvest is one way of keeping disease inoculum at low levels.

Another strategy to control Black Rot is through crop rotation and not planting in an area where brassicas or crucifers were planted for two years or more. If a disease was found in a field, it may be a good idea not to plant susceptible crucifers for a longer period of time. In constantly wet weather, this disease can be an ongoing problem. Another strategy is identifying and planting tolerant varieties.

Collards are also susceptible to Powdery Mildew, a whitish fungus in the surface of leaves which can cause early dieback of leaves in more humid seasons, but some varieties are more tolerant to this disease than others.

There are many popular collard varieties, and hybrids include Flash, Hi Crop, Heavy Crop, Top Bunch, Bulldog, and Tiger. Open-pollinated varieties include Vates, Champion, Morris Heading, and Georgia. Based on a trial of commercial varieties in Florida, the most heat-tolerant and bolt-resistant were Champion, Vates, and Flash.

Closely related varieties, with large rounded leaves, include Couve Tronchuda, Beira, Walking Stick Cabbage, and Galega de Folhas Lisas. Walking stick cabbage or kale is an old variety in Hawaii because it can be grown as a permanent addition to a subsistence garden. It can reach a height of 10 feet, and is propagated by chopping the stem in sections like

sugarcane and sticking it in the ground. Its leaves can serve as a constant food source, and are a great addition to a subsistence garden.

A New Invasive Species – Hala Scale

‘Pala ka hala, momona ka wana’ is a Hawaiian saying connecting activities on the land with those in the sea. In this case, when the Hala fruits are ripe, the sea urchin or wana is fat and ready to eat. There’s a similar saying that when the Hala is ripe, sharks bite, so keep your sea harvesting activities close to shore.

Hala, *Pandanus* spp., also known as Pandanus or Screwpine is an important canoe plant brought by the early Polynesians to Hawaii, and is used to weave cordage, thatching, mats, bags, bedding, and decoration. Fruits are also eaten and also sewn into lei.

In 1995, the Hala Scale was discovered in a shipment of hala plants from the South Pacific to Hana, Maui. From there, it quickly spread to other islands. It was recently confirmed on Molokai in Puko’o and is believed to have been on the island for more than 5 years.

The Hala Scale (*Thysanococcus pandani*) causes yellowing of and serious damage to Hala (*Pandanus tectorius*), resulting in leaf deformation, shortening of leaves, prop roots forming in unusual places, fruit deformation, and loss of plant vigor.

This Hala Scale is considered a major pest of Hala and is expected to cause serious damage especially to older, weaker, more susceptible plants by sucking the sap of plants. Long-term effects of scale attack on hala populations are likely to be severe, but only time will tell.

At this point in time, many hala plants throughout the islands look sickly as a result of this pest. The South Pacific island of Rarotonga, in the Cook Islands, apparently lost its Hala trees in the 1920s from a similar accidental insect introduction.

Insect biocontrol is based on the concept that an insect becomes a pest when its natural enemies are not present. When many of these pests reach Hawaii, they may not have natural enemies here, and this allows their population to explode. However, there are many predators of other scale species already established in Hawaii, especially Coccinellids or Lady Bugs, also known as Lady Bird Beetles, and some of them may zero in on the Hala Scale.

Others include tiny wasps such as Braconids and Ichneumonids that may parasitize adult scales and eggs, but one of the challenges is that many species dislike salt air and windy conditions where Hala is found. Many scales are controlled with horticultural oils such as Safer's Soap or Sunspray Superfine Oil which can suffocate them by clogging their breathing holes or spiracles.

Aside from using leaves for thatching, mats, leaves are also used in curry dishes and also to flavor rice in Southeast Asia. Hala leaves contain a compound similar to Basmati rice, considered a delicacy in many parts of the world. Fruits are also consumed and made into drinks. The Micronesian varieties are noted for their great tasting fruits.

The plant is dioecious; there are male and female trees. There are over 600 species of hala, and on many atolls, its importance is second only to coconuts. This icon of Hawaii is at risk if natural enemies cannot keep the Hala Scale in check.

Making Biochar

Although biochar is a relatively new term, it's not new to Molokai. We have a long history of making a kind biochar, but probably didn't realize it. Biochar is the production of charcoal under controlled conditions that retain certain compounds and structure that can be an important amendment for soil to benefit the growing of crops.

When incorporated in the soil, biochar serves as a catalyst and a 'sponge' that holds nutrients and water also allows for an easy exchange or movement of nutrients between soil and roots. It also creates an ideal environment for beneficial microorganisms to flourish.

In the past, Molokai kiawe charcoal producers lowered a giant metal bell over a pile of cut kiawe wood to control

burning through vents on the side of the bell. The kiawe could burn slowly and still retain much of its structure without disintegrating by fire.

Biochar differs in that woody organic material is heated to remove tars and oils, while still retaining its structure and resilience, then shutting down the fire by dousing or covering with dirt. The type of tree used, and the method in which biochar is produced greatly affects its quality, nutrient content, and effectiveness as a soil additive.

The most important measure of biochar quality is high adsorption or its ability to hold nutrients on its multilayered surface. This is referred to as its cation exchange capacity or its ability to make certain nutrients readily available to plants. The other important measures are its low resin and tar content. By burning off the undesirable tars, resins and hydrocarbons, the remaining material becomes a great soil enhancer.

It's believed that one of the key features of biochar is the creation of an ideal environment for microorganisms. This improvement in soil has a long-term effect since biochar is believed to last in soils for thousands of years.

The burning of prairies saw a renewal of the soil after burning, including the North American prairie west of the Mississippi River and east of the Rocky Mountains.

In the Amazon Basin, red soils similar to those found in Hoolehua were converted into very fertile soils through the use of

biochar. Known as Terra Preta or black earth and Terra Mulata, these soils were enhanced by farming systems practiced by ancient, indigenous cultures, and have remained fertile despite centuries of leaching from heavy tropical rains.

The use of biochar has a long history in Korea and Japan, and is being revived through heightened interest in sustainable and natural farming systems in Hawaii.

Biochar can be applied to the soil surface then tilling it in either by machinery or manually. It can be used incrementally in amounts as little as 300 pound per acre, then slowly increasing with each additional crop establishment.

Research conducted on red soils similar to that found in Hoolehua indicated that the use of biochar increased the above ground production of plant material or biomass by up to 189%. Using biochar of various pore sizes will create niches of a greater diversity for beneficial microorganisms.

Biochar also increases soil alkalinity which counteracts soil acidity, including adverse conditions created by the long term production of pineapple on Molokai.

A sustainable model for biochar production is the use of tree material from municipal tree waste and invasive species so it doesn't compete with wood that have other important uses. Heat, oil, and gas released from the production of biochar, if done on a large

scale, can also be recovered for the production of other products, including electricity and steam.

Field trials have started on Molokai in dryland taro and organic papaya through the generosity of Josiah Hunt of Biochar Hawaii. As with any amendment, you may have to readjust your fertility system to a new input.

For more information on biochar, you can download this publication from the UH CTAHR website.

<http://www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-30.pdf>

Ten Cent Flower

Puakenikeni, *Fragraea berteriana* or ‘ten cent flower’ is a popular lei flower native to the South Pacific. A common forest tree in the Cook Islands, it can reach over 50 feet tall under ideal conditions. One specimen in Pu’unui on Oahu was the height and breadth of the side of a Mom and Pop store.

There are many South Pacific legends connected to this plant, and flowers are also used to perfume coconut oil. It makes an excellent garden shrub, imparting its alluring fragrance throughout the yard and into the home.

Puakenikeni is a fast growing plant, and is efficient in taking up nutrients if adequately watered. Light fertilizing with a 10-30-10 or 10-20-20 type fertilizer is recommended, since over-fertilizing will create vegetative growth at the expense of flowers.

Prune plants to keep flowers within picking height makes it easier and safer to pick them, and will encourage flowering since flowers are produced on new growth. Constantly picking flowers and seed balls will produce more flowers because once seed balls mature, the plant’s energies will be focused on producing seeds instead of flowers.



Puakenikeni in its element in rainy Manoa and ready for another flowering blitz.

Air layering is the preferred method of propagation and can create 3-4 foot plants in a couple of months. When well rooted and ready to detach from the mother plant, it’s best to tie or brace the air layer in a five gallon pot or larger to allow them to root well. When planting in the yard, plants need at least a 15’ by 15’ space to grow.

Since flowers are easily bruised, they need to be handled delicately when collecting flowers and also sewing lei. Hawaiians believed that those without ‘hot hands’ can sew lei because flowers can be bruised and damaged from high temperatures. Flowers are picked early

in the morning and placed in a smooth or ti leaf-lined container.

Do not wet the flowers since it will cause discoloration. Ends of flower tubes, including the green calyx, are cut to space petals for eye appeal. A thin strip of cloth is used to sew puakenikeni lei since a thread will cut through flower tubes.

Flowers are not refrigerated. Completed leis are stored in a cake pan with a moistened paper towel covering the lei or in a sealed plastic bag placed in cold water. Flowers can be stored to create a desired color; fresh flowers are whitish while in a day or so, stored flowers will change from yellow to orange.

Do not store flowers or lei near ripening fruits and wilting flowers since Ethylene gas contained in these materials will accelerate aging of flowers leading to a shorter lei life.

Puakenikeni prefers full sun with moderate irrigation for optimal flowering, and is adapted to a wide range of climatic conditions. Extended hot periods may require heavier rates of the irrigation.

Common diseases include a leaf spot, especially when plants are weakened due to stress such as insufficient water. Fungal root rots and root-knot nematodes can be a problem so using compost when planting them and keeping them healthy and thriving is the key.

Mealy bugs and scales can be occasional problems, and the use of horticultural oils such as Safer's Soap, Volck Oil, or Sunspray Superfine oil to the affected areas can control them. Pollen feeding beetles are sometimes found in flowers but are of no consequence.

Puakenikeni can provide families with generations of fragrant flowers for lei if well cared for and nurtured.

Well, that's it for this month. The short days of winter are almost here. Overcast weather will result in slowed growth, especially for the truly tropical species, while our winter vegetables will thrive. Now is the time to get your seedlings started, and the rain may take care of the rest if you're lucky. More next time...

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