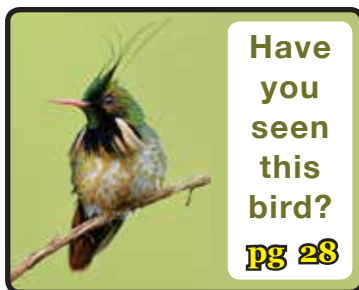


# The Belize Ag Report

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Big Falls, British Honduras...pg 6





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## Reforming Our Business Environment

By Jose Alpuche, Consultant,  
Elevate Consulting Limited



It is essential to periodically step back from the daily whirlwind to assess progress and examine challenges and opportunities ahead. It is especially critical at this juncture, when the rest of the world is doing this, that as individuals, enterprises, and government we undertake such reviews to help us understand and adopt to the new regional and global landscape as it emerges.

For decades Belize's economic outlook has been declining as we borrowed to finance capital projects, then added borrowing to finance social projects and now we are in crisis mode borrowing to finance recurrent spending. The Covid-19 pandemic has further weakened our fragile fiscal and economic position severely impacting the private sector. It is a complex problem that will not be quickly or painlessly resolved. It will require reorienting many entrenched policies and implementation of some tough measures that successive governments have postponed.

The fallout from the pandemic has also exposed some positive strength in our economy such as the agriculture and food sector which continues to operate while tourism and other services have all but collapsed. Not so long ago, agriculture was under the hammer from weather related losses. These events underscore the reality that, regardless of size, we need to develop a diversified economy - tourism, agriculture, and even more sectors - to overcome our steep challenges ahead. With the suffocating debt burden, we cannot expect a government investment-led growth; therefore the private sector must rise to the challenge. Volumes can be written on the reform required but space allows me to comment on only one aspect of relevance to agriculture and food production.

Pushed by the international financial institutions GOB has historically adopted investment policies that favour an open economy and foreign direct investments. These investment incentive schemes are primarily composed of exemption from taxes, duties, tariffs and other charges on capital investments and inputs. A handful of domestic enterprises have also benefitted from these, but the investment environment has evolved to the extent that hotels and casinos are enjoying tax breaks while other sectors are not. The common thread is that an enterprise must be big and well-resourced to benefit. This has created a very unlevel playing field where small and medium local investors must try to grow while carrying the full tax burden. It is an approach to investment that has stifled growth and fair competition and it must be corrected if we are to experience the much-needed growth. There have been several initiatives for small and medium enterprise, but they are always drenched with bureaucracy and political patronization; therefore the impact does not live up to the hype.

A simple change of approach to permanently removing taxes on the factors of production (capital investments and production inputs) and move taxes to actual output (success) can begin the transformation. Studies have shown that revenue loss to government would be a fraction of the amount allocated to social support spending.

By creating a business environment more conducive to fair competition, micro, small and medium enterprises would

finally assume their rightful role of creating jobs and increasing economic activity. The pandemic has exposed the ingenuity of many Belizeans as they strive to earn an honest living providing an impressive array of quality goods and services. This could be one of the critical levers that will allow us to move up from primary commodity production to value added goods. A simplification of the import duties and the tax code for local production will also have an added benefit of reducing the scope of graft and corruption. This move might seem contradictory to government's interest to close the fiscal deficit and increase revenue. However, it is only by extending the tax base through sustained growth that we will solve the structural economic problem. We may experience a temporary fall in revenue but that will be quickly replaced by more efficient collection from a larger base producing higher value goods.

There are also wider trade implications why this change is necessary. In less than four years, Central America will be opened for all US exports (except white corn) under the maturing Central American Free Trade Agreement (CAFTA). Will we remain competitive in this new trading environment? CARICOM countries are restructuring their food production systems and we face increasing pressure to allow extra-regional imports of raw commodities to other CARICOM countries for processing that will then be exported to Belize duty free. It will be the private sector that must adjust its business models to remain competitive and counter these changes. Vertical integration, domestic joint ventures, regional joint ventures, business consolidation are just a few of so many options to consider. In the private sector, we must know where we want to go, how we intend to get there and what assistance we will require of the government, keeping in mind that time is not on our side.

Other production issues such as climate adaptation, affordable financing, product development as well as postproduction issues such as market penetration are equally important. Please let us start an urgent process of identifying possible solutions to the challenges we face. As central government is facing its own storm, it is best we in the private sector present implementable solutions. We must ensure that in correcting the ship of state, domestic private sector growth is not stifled. We are all in this together!

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# From the Editor

With our population approaching 403,000, the lowest regional population density (approx. 45 people /sq. mile), plenty of arable land, a population with a strong farming base and ample opportunities for the private sector, Belize truly is “sitting pretty”. Until the climatic ravages of the severe drought of 2019, subsequent storms, and then COVID lockdowns and regulations, we were net exporters of food, as was Guyana, even though ironically both have been classified by CARICOM as LDCs – Less Developed Countries. However, as commodity exports grew, Belize’s appetite for more imported processed foods also grew. As part of an increasingly globalized world, Belize must evaluate how a small unique country like Belize fits into that large puzzle. Being greatly affected by the actions of larger countries, our actions need to be customized to provide long-term benefits.

Take health, for example. Our parents knew that you couldn’t buy good health. Somehow, with the increased zeal to partake of the world’s goodies, we have overlooked that many of these developed countries with diets high in processed foods, also lead the world in sicknesses and metabolic diseases. Not to worry – international pharmaceutical companies provide modern treatments for the modern influx of illnesses, some possibly resulting from the plethora of chemicals used both in growing and processing food. Belize joined the World Trade Organization. Although many facets of this might be beneficial, an often overlooked impact is that Belize is prohibited from mandating that produce imports be tested for minimum residue limits (MRLs) because we do not have mandated MRL testing for locally grown produce. There seems to be a growing call for domestic pesticide residue testing on local produce. If financing this service is the issue then reviewing the future health ramifications and **their** costs needs to be a part of that decision process. International buyers of our foods rigorously test them for residues; the time has come to give the same respect to the Belizean consumer.

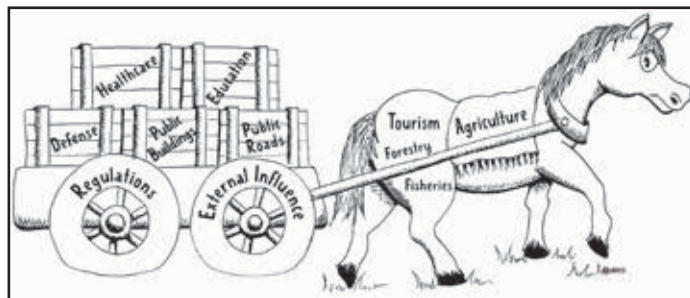
Food security has become a well-known concept here. Another less familiar term is *food sovereignty* – which implies that a country is secure in its independent ability to produce necessary foods. The most critical aspect of food sovereignty involves seeds and inputs necessary for farming: local seeds, especially those which have been developed locally over time and are adapted to local climates, soils, and growing conditions, and which are not dependent on heavy usage of imported inputs (chemicals and fertilizers). The Caribbean Agricultural Research and Development Institute (CARDI), via a good working relationship with GOB, has been an excellent source for open-pollinated corn and bean seeds. Additionally, many smaller corn, bean and vegetable farmers are learning to save seeds, which they replant, as well as sell and trade with other small farmers. Belize needs more emphasis and training for those that wish to save seeds. We have lost many of the heirloom (non-hybrid) seed varieties already in the push to be “modern”. Fortunately, many heirloom fruits and vegetable seeds may well be found in other tropical lowland places, such as Cuba.

Until the 1980’s when tourism really took off, agriculture, forestry and fisheries were the main engines of Belize’s economy. Having a population who have not totally forgotten about agriculture is quite valuable. In some other developed countries, such as the USA, the farming sector is aging and farmers are a shrinking workforce at less than 2%. In Belize we still have a generation who has not forgotten back yard farming – gardening, raising chickens and milpas. GOB must continue to foster that interest.

Perhaps it is also time to re-examine some of nature’s basic soil technologies.

- For every 1% of organic matter added to soil of medium texture, up to 20,000 gallons of water may be retained – useful for mitigating both floods and droughts (USDA data). Much of Belize’s cultivated acreages have decreased their topsoil to less than 2%. This could be increased by up to ¾% per year through regenerative practices not involving purchased inputs.
- The organic matter referred to above, is mainly carbon – as in carbon sequestration – pulling down the CO<sub>2</sub> from the atmosphere, etc.
- There is no soil restoration without restoration of microbial life in the soil. When beneficial microbes are killed, other neutral or harmful critters take their places. Some international soil consultants are doing less NPK-S analyses and doing more alternative tests - counting and evaluating the living soil microbes which are responsible for actually transporting the minerals into plants.

Although change is always daunting and difficult even in good times, Belize clearly has a bright future. Agriculture will be a vital part of that change.



*Trust in the Lord,  
but row away  
from the rocks.*

## Mission Statement:

**The Belize Ag Report is an independent semi-annual agriculture newsletter. Our purpose is to collect, edit and disseminate information useful to the Belizean producer, large or small. We invite opinions on issues, which are not necessarily our own. Belize Ag neither solicits nor accepts political ads.**



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## Pilot Project: Voluntary Third-Party Assurance Programme Belize Agricultural Health Authority

In April 2020, the Standards and Trade Development Facility (STDF) Working Group approved the pilot project STDF/PG/682: "Piloting the Use of Third-Party Assurance (TPA) Programme in Central America (Belize and Honduras) to Improve Food Safety Outcomes for Public Health and Trade". The Inter-American Institute for Cooperation on Agriculture (IICA) will be the implementing agency for this project, which officially started on 12 October 2020 and will end on 11 October 2023. It has an estimated budget of US \$942,612, of which US \$619,916 will be from the STDF and US \$322,696 is in-kind contribution from both Belize and Honduras (time allocated by officers of the respective agencies and ministries, venues, office supplies, transportation, etc.).

This pilot project in Belize is focusing on the poultry, beans and coconut industries; it is closely linked to the ongoing work in the Codex Committee on Food Import and Export Inspection and Certification Systems (CCFICS) on "Draft Guidelines for the Assessment and Use of Voluntary Third-Party Assurance (vTPA) Programmes".

In summary, the pilot contains three main areas:

- 1. A regulatory component:** focusing on the competent authorities (increasing knowledge on vTPAs; looking at the legislative framework; capacity building efforts and possible public/private partnership opportunities that would facilitate strategic changes to strengthen the food control management system based on Codex principles and guidelines);
- 2. Food business operators:** engaging the FBOs to improve food safety compliance in the selected value chains. This component is expected to foster growth and promotion of the selected value chains and open new opportunities which will also benefit consumers; and
- 3. Dissemination and learning component:** which will enable the beneficiary countries to receive mentoring from other stakeholders and especially food safety regulators who have used vTPA as part of their risk management strategies in their national food control system. It will also allow for the beneficiary countries to share experiences, challenges and lessons learnt regionally and globally.

A coordinating committee comprised of public and private sector representation will provide general oversight and support to this pilot project in Belize.

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# Big Falls Ranch

## British Honduras' 1<sup>st</sup> Agricultural Giant

### Part 1: Transitioning and the Early Years

By Roberson/Feucht



Some people uproot and move on because they have to; others appear to find the challenge of exploring and working in a land new to them somewhat irresistible. For Albert and Elizabeth (Betty) Bevis, successful general field crop farmers and cattle

ranchers in Patterson, California, it appears to be the latter which motivated them to sell out, leaving their secure lives in the fertile San Joaquin Valley. They brought their two sons with them to begin their agricultural journey in Central America. Their life-paths forever altered; the Bevis family at Big Falls left a strong and positive impact on the country and the people of British Honduras. The Bevis saga still kindles many fond and positive memories of British Honduras' first agricultural giant, Big Falls Ranch Limited.

What opened the Bevis' eyes to British Honduras? Remember, this was a decade prior to the *National Geographic's* initial January 1972 article about Belize titled *Belize, the Awakening Land*, in which Albert and Chuck were called "Prophets of Plenty", with an accompanying photo of them in one of their mature rice fields at Big Falls Ranch.

Travel back a few more decades: the riverside property known as Big Falls was owned by brothers Alvin and Patrick Burns (related to the Cayo Burns families). The only access was by boat, and remained so until the mid-1960's when the Bevises remedied that. The Burns brothers ran beef cattle on the property with Jamaican John Shaw (father of David and Pat Shaw) as their manager. In the mid-1950's, the Burns brothers sold Big Falls to some Texans. At about the same time, Machete Nile Ltd (M.N.L.) purchased Banana Bank, further up the Belize River. Chuck Bevis, son of Albert and Betty, learned about these Belizean ranches through their veterinarian in California, who was a shareholder in M.N.L. Chuck was offered and accepted a job at Banana Bank's cattle operation in 1962. That was the critical event that triggered the still ongoing chronicles of the Bevis family in Belize. Chuck astutely assessed British Honduras' vast agricultural potential and expressed that to his father. Albert Bevis traveled to British Honduras in August 1962 and concurred with son Chuck's appraisal. A dialogue toward the purchase of the Big Falls property ensued, and the Bevis family began their transition from established certified seed growers/general field crop farmers/cattle ranchers in California, to tropical agricultural pioneers. With no tropical experience under their belts, they liquidated their U.S. farm and began the process for the bold forward-looking leap to British Honduras.



With a 1960 population of approximately 100,000, Belize's national anthem accurately declared Belize as "a tranquil haven of democracy". *The Land of the Free* was written/music composed in 1963 and adopted as national anthem upon



independence in 1981. It was, and still is, as its author Governor General Coleville Young described. Although there were rules and regulations and protocols to learn, still – the Bevises had to first make the journey and *get* there. Some immigrants adapted fairly quickly to the colonial ambience; others did not. The Bevis family promptly adapted well, with smooth interactions between themselves and the people and governments of the day. The senior Bevis and son Chuck essentially moved down in early 1963. The family finalized and punctuated their international transition with a road trip in their 1964 Ford pick-up truck, from California to British Honduras, bringing younger son Jim, who had stayed behind attending school in California. At last, Jim would see Big Falls Ranch.

The Bevis' style was to be as well-prepared as possible "for eventualities"; thus they contacted the Mexican Consular office in Los Angeles, and asked Consul William Harrison Furlong for advice regarding travel by road from Monterrey, N.L. to Mexico D.F. (Mexico City). Many of his cautions regarding their proposed trek might have also been applied to the general undertaking of relocating to Belize in 1963. Below is an extract from Furlong's written advice to Albert and Betty:

*"There is no question that the severity of the trip which should be undertaken only by those of venturesome inclination, willing to forego the smoothness of pavement, the comforts of the metropolitan hotel, to accept the radical changes in the preparation of food and in general ready to take things as they come, however, it may be made with reasonably good chances of going through without mishap, provided the car, preferably the small type with maximum clearance, is in top mechanical condition and judgement is exercised by the driver."*

Albert, Betty and Jim enjoyed their Mexican travels immensely and would have liked to linger longer, but as Betty wrote, they felt compelled to "push on to B. H.". Betty kept a trip journal, beginning as they left California, on through Arizona, and New Mexico, entering Juarez, Mexico, then doubling back to El Paso as they had learned it was not advisable to bring Chuck's hunting rifle with them. Finally they departed the U.S. again at 2:30 PM of 22<sup>nd</sup> December 1963, arriving at Chetumal, Q. R. at 6 PM on 28<sup>th</sup> December, where they overnighted at the still operational Hotel Los Cocos. Departing Chetumal at 7:10 AM, they crossed into Belize by 8:30 AM on the 29<sup>th</sup>, and proceeded to the Fort George Hotel where they met son Chuck (about whom Betty entered: [Chuck] "still has beard". Monday 30<sup>th</sup> December, saw the Bevis men off to customs to check on imported tractors, seeds and equipment. Finally, after city business and holiday visiting, young Jim Bevis at last got his feet on the ground at Big Falls on 2<sup>nd</sup> January, 1964.

Of the 11,113 Big Falls Ranch acres which the family purchased in 1963, only about 1,000 acres along the Belize River were cleared and in pasture. A 1963 farm inventory noted 366 head of cattle, 48 horses, and 111 sheep. No crops had been grown on the farm;



cattle ranching was the main activity and income for the previous owners. The Bevises imported Jamaica Black bulls by plane from Jamaica. Later they purchased some Sugarland Brahman cattle from Central Farm which further upgraded the herd. By the 1980's Big Falls had a herd of about 1,800 head, running a cow calf operation using mainly Brahman cows crossed with Jamaica Black bulls. This yielded a bovine similar to today's Brangus. The cattle industry afforded a great lifestyle, but not a great income,



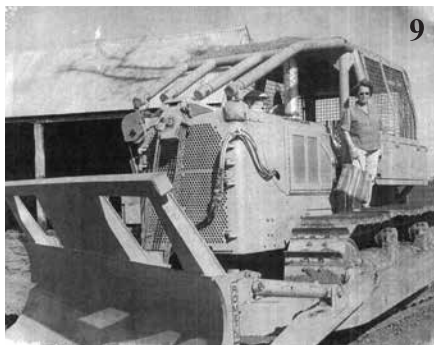
so Albert focused on finding additional crops which would enable the farm to prosper.

They planted trials of various crops to determine which would give a profitable stability, importing seeds from the U.S. (California and Gainesville, Fl.) and Central America. They planted forage sorghum,

RK beans, black eyes and lima beans. The row crops for the most part did well in the dry season. However, Albert wanted to find a crop he could plant semiannually, with 2 harvests per year.

How did they begin rice farming? Albert noted that although 'rice and beans' was a staple food in Belize, most of the rice eaten was an imported "#3 broken brewer's rice". Never having grown rice, he visited rice farms in Sacramento, California and in El Salvador, as well as in southern Belize. The Salvadoran farms were all dry season rice with single-cropping, as their land was not flat. The Big Falls land, dark alluvial clay soil capable of holding moisture, was fairly flat. That meant that they could create leveled-out contoured fields, enabling a flooded paddy system, seeding by plane, and harvesting 2 crops a year. This was cutting edge technology in British Honduras.

This writer gleaned (from the meticulous Bevis archives), that Betty was a strong independent Christian soul, who joyfully thrived in any location where life placed her. She and Albert resided on Eve Street in Belize City. Albert managed the business side of



the farm and liaised with the GOB which was situated in Belize City, the country's capital at that time. (Construction of Belmopan began in 1966, with GOB offices relocating there around 1970.) Son Chuck (Charles) and wife Carol, a former Papal Volunteer who had been a teacher at St. Catherine's Academy in Belize City, spent their weekdays on the farm, as Chuck was the farm manager. On weekends the couples switched places. Both Chuck and Albert were pilots and flew their private plane back and forth.



Chuck and Carol had met in Belize, and married in October 1964 in her home town of St. Louis, Missouri. The wedding featured "two traditional 3-tiered wedding cakes, and a wedding cake baked in British Honduras by Mrs. Leopold Balderamos (sister of George Price and mother of Dolores Balderamos) and brought to St. Louis by the bridegroom."



*Continues on page 14*

#### Photo Details: Cover, Pages 6 & 7

1. D-8 H Caterpillar with a Rome KG land clearing blade
2. Unseeded flooded rice paddies in the foreground; Hancock earth moving scrapers doing road construction on the main road through the paddies in the central portion of the photo, while in the sky, the Ag Cat can be seen passing overhead on its way to seed a different field. Circa 1965-66
3. Big Falls' John Deere rice combine harvesting rice in the early years
4. Albert, better known as Al, and Betty circa 1965
5. Credit: National Geographic
6. Al and Chuck by the John Deere combine, circa 1966
7. Chuck inspecting newly imported Jamaica Black bulls, *Harmony Hall Charlie* and *Glen*, February 1965.
8. Chuck, E.T. York and Eric King in a forage sorghum field, June 1966
9. Betty on one of their several D-8H Caterpillars with the Rome KG land clearing blades. Big Falls owned 4 or 5 of these machines which they used to clear thousands of acres.
10. The Big Falls company plane, *Hotel Bravo Foxtrot*, a Cessna 206. Note the *B Falling F* brand on its tail.
11. Chuck, Carol, Mark, Betty, Al and Karen Bevis, posed in front of one of the D-8H Caterpillars, January 1969. Photo taken by Charles Miller.



# BEYOND THE BACKYARD

## The Oil of Tranquility, the Scent of Success - Vetiver

By Jenny Wildman



Oh no a termite invasion! The soldiers and workers are out in full force sourcing and collecting to deliver precious food to the colony and satisfy the king and queen. Arboreal and terrestrial coming from all directions and hiding in dark, dank places consuming dry wood. They do an excellent job of clearing the forests of debris but current weather conditions have them seeking the warmth of the inside. Not wanting to poison the household with dangerous chemicals I look for other non-toxic alternatives.

Suggestions are borax, salt, dish soap, garlic, neem, aloe vera, diatomaceous earth, orange oil, cedar oil, bright light and nootkatone. What the heck is *nootkatone*? It is derived from plant

sources and when used on termites they become disorganized and are unable to complete their tasks of returning with food therefore killing the colony by starvation. Sounds promising; it can be synthesized but we are looking for the truly natural that is not hazardous to the health of humans, animals and the environment. Nootkatone is found in Alaskan cedar, grapefruit and other citrus fruits and also in **vetiver**. Having experienced the benefit of cedar chests and closets and known of lumber whose oil content is an insect deterrent I could understand this, yet vetiver was a new concept.

I had seen vetiver growing at the Belize Spice Farm and learned of its amazing root system which grows to an incredible depth of 12 feet or more in 9 months to 4 years depending on conditions. This clumping grass *Chrysopogon zizanioides*, also called khus, is closely related to sorghum and is a native of India grown in tropical climates. Its Tamil name means "cut root" and that is what it is grown for, making a very lucrative source of income for farmers. Today the major producers are China, Haiti and Java. The dry roots are sold to distill into oil for fragrances used in perfume and aftershave by renowned Houses of Dior, Guerlain and L'Occitane. It presents a smoky, woody scented profile with a hint of grapefruit, popular in men's cologne. As it is harvested its unique perfume is instantly released, a little more grassy than its Cymbopogon cousins lemongrass and citronella. In Fiji the upper grasses are used to make beautiful thatch roofs. In the hot summers of India vetiver mats are used to cool the rooms and sachets of cut roots are added to stone jars to cool water. All parts of the plant can be utilized to fabricate mats, sandals, bags, baskets, ropes, decorative items and ground up to make incense. The oil is an ingredient that is non-toxic and commonly used to flavor food and drinks and is essential in Mughlai cooking, medieval Indo Persian cuisine.

Vetiver is rich in vitamins A, B and C plus many essential minerals and is known for its calming cooling properties. Root water (30 grams chopped root to one liter of water, simmered and reduced to 50%) will relieve constipation, cleanse the digestive system and boost metabolism. To make a syrup chop roots and leaves and soak overnight, strain and heat with sugar, simmer until reduced. Then add ¼ syrup to ¾ water to create a cooling cleansing sherbet or add to drinks. It controls anxiety and aids sleep and may be helpful for attention deficiency. As medicine it is also used for arthritis, muscle pain, burns, stings, wounds, to reduce scarring, to promote regeneration of cells and to fight the flu. This amazing plant is safe for human consumption but is quite capable of killing all manner of insects: ticks, mosquitoes, lice, sand flies and has even been developed into an EPA approved repellent. This is great news as viruses are on the rise; vetiver could offer protection from infection from bugs carrying West Nile virus, malaria, dengue, Zika, chikungunya, and Lyme disease and for those sensitive to chemicals. Imagine a wonderful smelling soap or lotion that nourishes the skin yet can also repel dangerous pests.

Vetiver has been known for centuries as an aid to cleansing soil and water systems from heavy metals, toxins, arsenic and sewage runoffs. Rafts can be constructed from the bundled roots to float and purify water. It is easy to grow in almost any soils. It makes an excellent border and can protect crops such as coffee against pests. However to protect against termites the roots must be broken to release the nootkatone. The clumps are sometimes used by surveyors to establish reliable property lines. It is used on hillsides to combat erosion and also planted to protect sea walls. Some people have chosen vetiver as a decorative edge plant outstanding with its crimson plumes. Although drought



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tolerant it copes well with flooding. A good place to plant is where there is a drainage problem; as with most grasses like papyrus it is thirsty and can readily control the problem of standing water.

During the current world situation with COVID some interesting uses of vetiver have emerged. The Indian Railway is using Khus mats in quarantine isolation coaches for beds and insulation. At The Lovely Professional University (LPU) in Phagmara in the Punjab, India a group of students have designed effective vetiver face masks. Initially this was for the increased pollution in Delhi but continued

on to develop a 4 layer mask with an air filter, a World Health Organization (WHO) approved shield and fabric which strengthens the immune system. Congratulations guys.

Lastly the biomass can be used for mulching and composting and has been found to be an excellent medium for growing mushrooms. As to using as a fodder for livestock, the younger

leaves can be used but the older are too tough. Vetiver can be a promising food supplement for poultry and ruminants, due to its antibacterial, antioxidant, antifungal properties, in industries where antibiotics have been banned due to their potential harm to humans.

For now my termites will need to be dispelled by other means but I will certainly be growing some vetiver for the future and adopting some of the cooling soothing practices that have been tried and tested with time.

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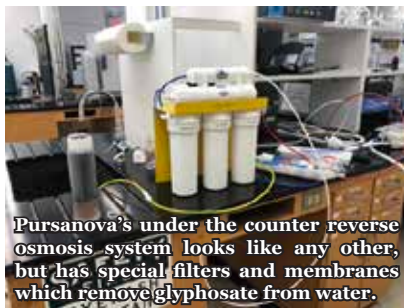
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**CASA MASCIA, TOLEDO, BELIZE.**

# A Proven System To Restore Health-Giving Energy In Your Water

By Jerry Carlson



Pursanova's under the counter reverse osmosis system looks like any other, but has special filters and membranes which remove glyphosate from water.

Our research farm is among 5,000 farms and households worldwide gaining benefits from the growing line of water treatment systems developed by Vatché Keuftedjian, founder of Pursanova Ltd. Inc. ([www.pursanova.com](http://www.pursanova.com))

Farmers and major firms such as refineries and food processors use Pursanova systems to overcome the pervasive degradation of water everywhere on the planet.

Two systems — the Pursanova Tube and Pursanova Disk — restore the natural energetic activation of water. The ideal combination for a farm or household has four sequential components: a triple filter, the tube and disk, and Pursanova's most recent technology for household use: an under-the-counter reverse osmosis system. All four of Pursanova's components are available in sizes ranging from household capacity to industrial, such as huge refineries and manufacturing.

Pursanova's Under the Counter Water Treatment System [UTC], including the household units, *remove glyphosate*. This powerful antibiotic and weed killer is a toxic threat that's most severe in farming areas. Repeated analysis by HRI Labs in Fairfield, IA confirmed that water laced with up to 3.3 ng/ml of Roundup — then cleaned with the UTC which includes the PN-12 Activation Tube — had no detectible glyphosate residue. Dr. Don Huber, respected worldwide for his carefully documented, repeated warnings about glyphosate, also confirms the Pursanova UTC system's ability to remove both glyphosate and its metabolite, AMPA. Dr. Huber says, "Pursanova is the only system I know of that does remove glyphosate from water." Dr. Huber is Emeritus Professor of Purdue University. (I've honored Dr. Huber on our website at this web address: <https://www.renewablefarming.com/index.php/the-purdue-professor-heard-round-the-world>)

Vatché says, "Water treated through our system regains its natural harmonic frequency, like a pure mountain stream. When you drink Pursanova water or use it as a carrier for foliar nutrients, living cells recognize that energy and metabolize it." Our family confirms that with almost a decade of personal experience.

## Pursanova system benefits for families and farms:

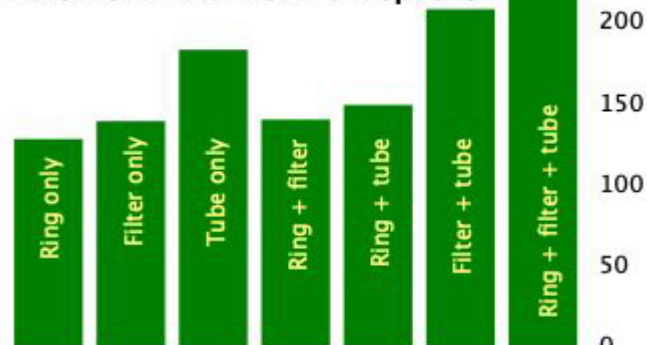
- Healthier dairy cows, beef animals and hogs. Pig deaths typically drop more than half.
- Fewer antibiotics needed; lower veterinary expenses.
- Meat quality rises.
- Livestock facility odor and sanitation improve.
- Contact herbicide rates can be reduced, with no loss of effectiveness, using water treated through the tube, ring and a farm-sized Pursanova industrial RO system.
- Fresh produce yields and period of freshness increase because water retention in leaves and fruit is increased.
- Complete removal of glyphosate residues in water as proved in laboratory tests. (Glyphosate is implicated in U.S. class action lawsuits as a cause of cancer. Bayer, a current maker of glyphosate-containing Roundup, is attempting to negotiate a multi-billion-dollar medical damage settlement.)

Vatché says his objective for 25 years has been to restore often-contaminated water to its original, naturally energized and harmonic state. Dozens of firms have attempted to "structure" [activate] water with magnetic tubes or electrically powered frequencies. So far, none equal Pursanova's systems, which use only natural energy of flowing water. The Pursanova tube and disk are based on quantum physics principles, refined from years of intense research.

A quick background: Vatché studied in Japan for his doctorate degree in quantum-physics. Early in his career, his young son Alex developed a life-threatening chronic illness. Doctors' diagnoses implicated water contamination as a contributing factor. Vatché and his wife spent considerable amount of investment and time researching "every water filtration and purification treatment on the planet to help heal our son." None of them helped. Tapping into his Japanese academic connections in quantum physics, Vatché established a laboratory in Japan for water research. His team found that the molecular structure of water includes four unknown hydrogen atoms in periphery orbits, in addition to the two accepted as basic H<sub>2</sub>O. Most physicists dismissed the finding. But four years ago, the research community verified water's four "extra" hydrogen atoms. His Japanese research team found that when specific harmonic energy is added to a water molecule the two primary-bonded hydrogen atoms greatly amplify their motion and energy "by a thousand times" [connect and disconnect]. When that occurs, a primary hydrogen atom exchanges orbits with one or more of the secondary hydrogen atoms, releasing energy which has beneficial metabolic benefits, as well as making water a more powerful solvent to hold dissolved minerals [lower surface tension].

Here's one of nature's clues that originally pointed Vatché toward energetic possibilities of water treatment: In Japan, he often explored the countryside. He noticed that fish in one clear stream formed schools *only* in a short section of the stream. He netted 40 fish and tagged half of them with a yellow tag; the other half with a blue tag. He released the 20 blue-tagged fish five miles upstream from the school of fish. He released the 20 yellow-tagged fish five miles downstream from the favored stretch. "Within a week, I counted all those released fish back in their original school," Vatché says. This observation has become a mainstay in convincing skeptics that water's energetic pattern has an impact on living cells and organisms. With local permission, Vatché explored the rocky stream bed where fish congregated. He found pebbles and rocks with unique mineral structures. This stream, and a nearby lake with identical minerals, became the "ore" Pursanova used to impart energy frequencies into water.

**Percent increase of treated plant weight over untreated weight under seven Pursanova water treatment options**



Data: Swiss chard growth trial by Dr Michael McNeill, Ag Advisory, Ltd., Algona IA



The natural ore is powdered and compressed via 1250-degree Celsius ovens into “marbles” [surface becomes negative zeta] which fill the Pursanova tube. Water flows through the tube in a rhythmic flow, amplified by a systematic pattern on the inner wall of the special stainless- alloy tube. Result: “Water regains its healthy, natural energy,” says Vatché. When “hard” water is treated with the mineral ores and Pursanova disk, it becomes a stronger solvent, keeping calcium carbonate and other minerals in solution, instead of depositing “lime” in pipes.

A “dean” of professional crop consultants in the U.S. Midwest, Dr. Michael McNeill of Algona, IA, demonstrated the growth-stimulating benefits of water treated with Pursanova components. Growing watercress and Swiss chard under uniform interior lights, McNeill measured the vegetative growth under a control of untreated water, plus water treated under seven variations of Pursanova components. Plants receiving water from the filters, PN 25 tube and disk achieved almost 250% more weight than plants given untreated well water.

**Editor's Note:** Jerry Carlson's family owns and operates Renewable Farming LLC in Cedar Falls, IA. They manufacture WakeUP, a plant-based surfactant/ penetrant for crops (see ad pg 37), and publish ecologically sound ideas for farmers on [www.renewablefarming.com](http://www.renewablefarming.com). Jerry is former Managing Editor of Farm Journal magazine and co-founder of Professional Farmers of America, an ag advisory service. He has nearly a decade of experience using Pursanova products.

More information from Dr. Don Huber on glyphosate go to [https://agreport.bz/wp-content/uploads/Issues/PDF-Files/Belize-Ag-Report\\_Issue-43-Aug-2020.pdf](https://agreport.bz/wp-content/uploads/Issues/PDF-Files/Belize-Ag-Report_Issue-43-Aug-2020.pdf) issue 43 pg 26.



**Now: Glyphosate-free, energized water for every farm and family's health!**

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Vatché Keuftidjian, founder and owner of Pursanova Ltd., won the top environmental sciences award from the International Trade Council. Among global firms, it's comparable to the Nobel prize for safe new technology.



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To Address The Weak Activation "Hydrogen" Power in Water. Without it Water have no Energy



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## Quest for the Right Hemp Cultivars

By Karin Westdyk



After meeting Jack Herer in the late 80's, reading his book, and researching industrial hemp for the nine articles I wrote for the AgReport since 2016, I am convinced that Jack was right..."Hemp can save the world!"

Most products that we buy, use, and then dispose of are created from what we mine, extract, process, burn, and discard; they have created imbalances in nature adding greatly to the climate stresses affecting our world. Yet, most products we buy, use, and then dispose of can be made from biodegradable hemp planted and grown by farmers and gardeners: food, oils, fiber, fuel, building materials, plastics, and medicine. Now legally grown in over 30 countries around the world, industrial hemp is a viable resource for raw materials that can be incorporated into an estimated 50,000 commercial products.

Hemp is not only far more environmentally friendly, but it can save the health and pockets of our farmers far more than traditional agricultural crops because hemp requires less water, little if any pesticides, and eliminates the need for expensive toxic weed killers when used in rotation. Furthermore, hemp actually cleans the soil of contaminants wherever it is grown.

There is no doubt that hemp could be a very large part of the solution to the problems associated with climate change, our compromised soil, water and air pollution, as well as the economic woes we are now experiencing since COVID pulled the plug on the economy. Fortunately for us, the world is responding by encouraging farmers to grow hemp after nearly 100 years of prohibition based on disinformation by lumping it together with its cousin, marijuana.

This is not the first time farmers have been encouraged to grow hemp. Since ancient times hemp has played a major role in civilization; it was even considered a prized medicine according to ancient Chinese medical texts. Because of its superiority in producing fiber for sailing ships, hemp seed was disseminated throughout colonial America and farmers in the British colonies were actually compelled by British law to grow it. And, as recently as WWII, American farmers were encouraged to grow hemp for the war effort.

Many do not know that hemp was one of the main export crops of the Americas until the Civil War when slavery was abolished. Because harvesting and preparing hemp at that time was so labor-intensive former slave owners could not afford to continue and switched to cotton, which then became the main fiber crop replacing hemp. But in 1937 a machine designed to remove the fiber-bearing cortex from the rest of the hemp stalk was patented in Germany; use of the machine made it possible to make hemp fiber without prohibitive amounts of human labor. *Popular Mechanics* magazine described hemp as the new billion dollar crop, and in 1938, *Mechanical Engineering* claimed hemp could be the most profitable and desirable crop for farmers to grow. However, the campaign to revive agricultural hemp was thwarted and met with a massive campaign to prohibit hemp farming by

those who had vested interests in producing paper from trees (adding greatly to deforestation, and using what proved to be an extremely polluting process to produce it from trees), and those who were heavily vested in petrochemicals. Both industries could have been replaced by a hemp industry to make paper and industrial chemicals.

Though industrial hemp grows well wherever it has been traditionally grown, there are apparently no hemp cultivars that will thrive in tropical climates with low enough levels of THC and only 12 hours of daylight. But because the tropics could easily provide 3 to even 4 harvests a year, plant geneticists throughout the world are racing to breed a cultivar that will. In my research for this and other articles on industrial hemp, I have explored many possibilities and received lots of positive responses, "Yes, we can sell Belize farmers the seeds that will work". But, many are just trying to sell seeds that they may not even know will not work in a tropical climate. I was referred to experts from Holland's Wageningen University & Research Centre and spoke to plant geneticists and plant agronomists from Europe to China to Cambodia, most of whom reiterated that industrial hemp acclimatized to northern latitudes will not grow well in the tropics.

Colombia, with its diverse geography and tropical climate seems to be doing the most to find a solution. Many farmers there, as well as in Belize want to grow hemp but without a viable seed, they are discouraged. For many years, Colombian geneticists have been working to breed seeds that will be resistant to fungal diseases caused by moisture and seeds that will never exceed the low-THC limits established by the countries that have legalized industrial hemp.

Seed approval and certification remains new for hemp, but is an essential part of any hemp program in any country. It often takes years of continuous testing to get a new cultivar certified. The European Union and Canada, both having legalized low-THC hemp 30 years ago, now have a number of certified hemp cultivars, none of which would thrive in the tropics. It is certain that when a cultivar is discovered or bred that fulfils the requirements for tropical growing, a demand for seed will be greatly increased, creating another market for hemp.

In an article describing Columbia's hemp seed program, Ryan Douglas, with 23 years of commercial horticultural experience and who once served as master grower of Canada's largest licensed producer of medical cannabis, makes the point that a government-certified seed variety will foster greater confidence and will appeal to farmers everywhere that hemp is grown and regulated. Douglas claims that all too often farmers who had purchased land and licenses have found the seed they had also purchased was "garbage in terms of germination rate or male-to-female performance." Douglas now serves on the board of directors of Association of Breeders Exporting Colombian-certified Seeds (ABESCO), one of two organizations operating in Columbia headed by Manuel Baselga. ABESCO is working to position Columbia as a global leader in exports of certified strains and one of its core targets is breeding hemp strains for the tropics.

613 Partners, a global cannabis services practice of passionate lawyers, scientists and consultants, has been instrumental in establishing hemp programs where none existed; it is a leading international cannabis consulting firm with a strong presence in Latin America. 613 Partners is a founding member of advocacy platforms called Hemp The Climate, The Latin American Industrial Hemp Association, and The Spanish Hemp Association, as well as ABESCO. Hemp the Climate is currently undertaking a life cycle assessment on a hemp plantation for the production of bio-composites from hemp fiber, and is conducting





## Greenhouse: Recreational Medical Therapeutic

all the necessary analysis with regards to CO<sub>2</sub> absorption and sequestration in both biomass and soil; its main goal is to understand the capacity of hemp to absorb and sequester CO<sub>2</sub> from data gathered from different varieties, with the ultimate goal being able to commercialize carbon credits from hemp plantations. Juan Matos Paredes of the organization said, "For that to happen, first we need to understand the potential worldwide."

I spoke to Manuel Baselga at length and he explained that 613 Partners' main function is strategic investment advice and helping businesses from their early start-up phases — from compliance to understanding global market trends to supplying the right genetics for specific climate conditions. Their operations team is currently managing growth operations in 6 different countries, including South America's 2 largest hemp farms in Paraguay and Uruguay.

Baselga emphasized the importance of having a strong regulatory practice powered by public affairs professionals and former cannabis regulators. "This unit of 613 Partners is actively involved in assisting regional governments in understanding cannabis regulation nuances and in applying lessons learned from other regional markets that have already entered the sector." They are currently actively supporting regulators in countries like Colombia, Ecuador, Paraguay, Costa Rica, and others. When asked, he added that he would be happy to engage with public officials in Belize to help them understand the unique opportunity this sector presents for Belize, and how to draft legislation that facilitates employment opportunities, foreign investment and long term value creation for the country. "This is especially important with regard to seed regulation. A thorough understanding of the potential regulatory pitfalls is key to the success of the sector", Baselga said; "Our group is one of the largest, if not the largest, holder of government certified hemp and cannabis cultivars in the region, most of which have been specifically selected for subtropical regions. Our breeding team works with regional universities and researchers to improve and stabilize strains well-suited for the particular conditions of this part of the world, where high humidity levels and a year-long 12/12 daylight cycle present unique challenges to European and North American hemp/cannabis strains." He went on to explain, "The hemp/cannabis sector is rife with opportunists and irresponsible self-named advisors. This presents a dangerous threat to private and public sector stakeholders aware of their own lack of expertise and looking for outside help. Help seekers should do solid due diligence on anyone engaging them for advising or supply contracts. 613 Partners' public sector advisory, whether strategic, regulatory or technical, is pro-bono because it is in everyone's interest to see the hemp industry grow in a sustainable, orderly way, and this is our contribution." Baselga said he has already received many requests for seeds and strategic advice from Belize in the last months and looks forward to working closely with regulators and investors alike in 2021.

**I attended the virtual Town Hall Meeting on January 27th sponsored by the Ministry of New Growth Industries with the Hon. Kareem Musa and invited**

presenter Alex Lavin, CEO of Growth Industries, a company in Rhode Island described as a manufacturer and distributor of several premium hemp-based brands and products. According to the Amandala Press, Lavin has been chosen as the consultant to help develop the cannabis industry in Belize, and to tie that industry with the tourism industry.

Though it is legal for people to use recreational cannabis in Belize and possess up to 10 grams, Hon. Musa pointed out that it is not legal to grow it, buy it, or sell it, so any economic benefits are going out of country. Lavin, a frequent visitor to Belize, who has roots in the Caribbean, emphasized how having standards, regulations, and good business methods could grow the economy with a cannabis tourist program, increasing jobs and boosting the tourism market.

The presentation focused predominantly on medical and recreational cannabis and the importance of establishing high standards in farming practices as well as processing practices in order for Belize to be competitive and successful in a world where cannabis can be a big part of the economic, environmental, and health solutions. For the medical, therapeutic, and recreational markets, he emphasized the importance of growing cannabis organically, stating that quality trumps all.

Over 200 people were in attendance at this meeting so it was difficult to accommodate the many questions people had. Questions and comments posted on the chat board were as diverse as the people asking them: those who needed CBD medicine; those who used cannabis as a religious sacrament; farmers who were interested in growing hemp for seed or fiber, making hempcrete for building, for fuel to run their tractors, or as a rotation crop; investors; tourist operators; the questions flew.

One of the biggest concerns was whether the hemp industry in Belize will be dominated by foreign companies shutting the Belizean farmer out, but as noted by Manuel Baselga, a good plan must be designed to benefit all.



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## Big Falls...Continued from page 7

Betty and Carol successfully dealt with general living and homemaking challenges. After the farm's initial start-up, the company generators provided them with reliable power, and they learned how to deal with rain water. There were no city water systems anywhere in British Honduras; everyone relied on either catchment of rain water or river water. Several U.S. newspapers wrote articles quoting Betty as saying "well, you can always boil water...". Both husbands were fortunate as their wives enjoyed the challenges of learning about local foods and new techniques. Betty commented to one journalist that in Belize, when you

12



saw something in a store that you wanted, it was best to get it then – not to wait as it likely would be soon gone. That was quite common during the 1960's and 1970's, and curiously, seems to have returned to Belize again due to COVID's effects on imports.

After a couple years of arduous transportation logistics – traveling either by private plane, with their own company plane and company airstrip, or via combination river and road transport to Belize City, by 1965 Big Falls was ready to build the 10 miles of

Checking "New road",  
cut out To  
Milepost "31" - on Cayo Rd.

13



road necessary to connect the ranch with the Western Highway (George Price Hwy). This involved crossing miles of swampland and building bridges, including one crossing Cox Creek, which is

**Continues on page 38**

### Photo Details: Page 14

- 12. 40 - 20 Root Rake, matched to D-6B Cat used for rotten stump removal from fields, February 1967.
- 13. Jim and Chuck checking out the new road, cut out to Milepost 31 on the 'Cayo Rd.' (future Western Highway). They're riding local 'bamboo' horses.



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## **Belize Raptor Center Helps Farmers By Valerie Motyka and Sarah Mann**



If you are having trouble with rodents on your farm you are not alone. Rodent populations have been increasing over the years while predator populations have been decreasing and the only people we have to blame is ourselves. Farming unfortunately does contribute to

habitat loss and with that loss comes a less friendly place for our apex predators and a nice safe haven for the vermin, especially rats and squirrels.

### ***Red-tailed Hawks with gray squirrels***



Photo by John Antonelli Sr.

If our farming practices are solely monocropping and stripping away all the places predator birds can hunt from and nest in. As well as all the places predator mammals can hunt and raise their young from without trying to replace any of it then we are creating a huge imbalance in the natural system and ultimately problems with increases of vermin animals.



Photo by Lindsay Day

Chemical manufactures promise control however their toxins are proven to have negative effects on non-target species, including humans. It takes 7-10 days for most rodent toxins to have a lethal effect and some rodents are even building up a resistance to the poison. If these sick and disoriented rodents are preyed upon or scavenged after death, whatever eats it will eventually succumb to the same demise adding to the vicious cycle.

Here at the Belize Raptor Center we are working to stop the cycle. We have been teaming up with some farmers along with an Integrated Pest Control Specialist out of the States to help us do so. With a little bit of work we can start incorporating inclusive infrastructure for beneficial predator species without using harmful chemical controls and possibly insecticides. It may take some extra work in the beginning but in the long run we believe that this could help our farms, multiple species in decline, our community and even increase agricultural profit while adding wildlife tourism opportunities to our community.

Coconut damage due to the increasing populations of squirrels is becoming a huge problem for many farmers throughout the country of Belize. Squirrels are pesky rodents who live in large colony groups and care for each other young. If a parent dies a neighbor will raise the babies left behind. Squirrel populations increase when predator populations decrease.

This is called the predator-prey (vermin) cycle. When the predator populations increase, prey decreases. When humans intervene in the Predator-Prey Cycle we start to witness chaos in the system. Prey increases drastically causing catastrophic damage to crops and causing huge monetary loss to farmers.

Incorporating beneficial habitats throughout our farms is a great natural way to create long term cost effective rodent control, help our community, and help our wildlife. Small areas of wild growth in the right place provides sanctuary for struggling bat

and songbird species that eat insects. A larger area of natural growth may provide habitat for fox or other mammals that make dens and also eat rodents. A properly placed hunting perch acts like a dinner bell to hawks, eagles, and falcons that are looking for a good place to hunt from and by providing nesting structures for species such as barn owls that can provide night time rodent control at the rate of 15 rodents a night per nest or over 100 rodents a week.

If you are having rodent trouble in storage areas we also need to look at exclusion products. Do you have waste lying around that rodents like to nest in. Are you closing the door only for there to be coin sized gaps that rodents can access easily. All



Barn owl boxes installation

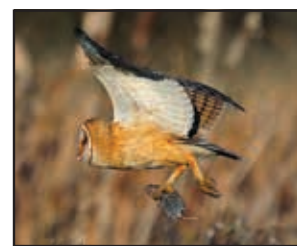


Baby barn owls  
inside the box  
Valley of Peace  
Farms

these things are part of the evaluation process of coming up with a good integrated pest management approach and we are happy to work with the farms and communities to help make it happen. No there is not one nest box that will solve the entire issue but there is no poison that will do that either. The goal is for farmers and conservation groups to work together in order to utilize much needed declining and beneficial predator species while helping farmers decrease problematic out of control species.

Contact us for a consultation on how your business can begin integrating poison free pest control. 615-0226/615-0266 or email: belizeraptorcenter@gmail.com

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## Pyroligneous Acid (Wood Vinegar) Use for Agricultural Production

By Gerardo Aldana, PhD

My studies have shown that increase in agricultural production, if improperly managed, can cause detrimental effects to the natural environment. Other researchers have written that global biomass production output from agriculture and forestry alone estimates to 146 billion MT a year. Burning any waste biomass can release ash, sulphate aerosols and trace gases that can contribute to global warming, biodiversity extinction, serious socio-economic and health problems, and soil degradation. These effects negatively affect agricultural production. Therefore, as I have noted in my research findings, it is vital that we obtain strategies that will sustain agriculture and at the same time mitigate and adapt to climate change.

Many countries have started to promote strategies that include using renewable natural resources to mitigate global environmental and health issues. One of these strategies includes the conversion of waste agricultural biomass into various gaseous, liquid, and solid fuels by processes such as pyrolysis. Pyrolysis is defined as the thermochemical conversion of carbonaceous material, such as agricultural waste biomass, under a limited supply of oxygen and high temperatures, for the production of biochar, smoke, pyroligneous acid (commonly known as wood vinegar) and different gases. The process can reduce greenhouse gas emissions, convert waste biomass into a more stable carbon form, serve as a carbon sink, and help to increase soil fertility and agriculture production.

There are many agricultural benefits associated with wood vinegar; it is characterized by over 200 water soluble chemical compounds, with 80 to 90% water and 10-20% organic chemical compounds. Acetic acid accounts for 50% in solution. A study in 2018 showed that when included in agricultural practices, wood vinegar can increase harvest yield of many plant species through enhancement of seed germination, plant growth, fruit size, weight, and quality. Researcher J. Mmojieje reported in 2016 that wood vinegar also has natural pesticide properties and allows us to fight against plant pathogens such as bacteria and fungi naturally and effectively.

Just last year in 2020, researchers reported that wood vinegar is an organic fertilizer and can improve soil health by increasing microbial activity. Therefore, it is gaining wide attention in sustainable agriculture due to its organic properties. Researcher A. Grewal and team reported that waste agricultural biomass feedstock can be used for the production of wood vinegar. The feedstock can include barks, residues from wood processing, agricultural biomass such as coconut shell and husk, bamboo, straw, bagasse from sugar cane, corn cobs, etc. Characteristics of the resulting wood vinegar varies depending on the type of feedstock used for production. For example, a mixture of holy basil, an herbaceous plant biomass, mixed with coconut shell and husk, at equal amounts, yields high insecticidal characteristics against striped mealy bugs.

Wood vinegar can be an ecological and sustainable tool for agriculture. The benefits from using it are due to its fascinating chemical composition; it also has natural pesticidal and plant growth enhancing properties. Plus the use of wood vinegar in agriculture can produce healthier and cleaner natural environments, as well as increase agricultural productivity. Producing it is also beneficial to agriculture and the environment, especially in Belize with its abundance of coconuts; it is a means of "recycling" coconut waste, managing other agricultural waste, and is a very environmentally friendly strategy to combat climate change.

**Editor's note: Dr Gerardo Aldana is a recent graduate from the School of Natural and Environmental Sciences at Newcastle University. Dr Aldana is a specialist in soil science, agrochemical management and stakeholder engagement. His research interests focus on defining strategies to reduce the impacts of agriculture production on the natural environment. Specifically, he focuses on the use of biochar and other products to maintain healthier soils and water, and at the same time to reduce climate change. Dr. Aldana is currently a part-time lecturer at the University of Belize, focusing on crop nutrition, fertilizer use and climate smart agriculture.**



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## Wood Vinegar for Agriculture

### Compiled by Dottie Feucht

### from Midwest Biochar information

Wood Vinegar is a natural extract from woods. It is used in agriculture and animal fodders. The natural contents are non-toxic and biodegradable, making it an attractive alternative to chemical pesticides and fertilizers and a good choice for organic farming. Wood vinegar reduces the cluster value of water to 1/3. This means that the water is activated and can be easily absorbed by the plants and animals because water with a low cluster value is in a very small mass. Each of these masses holds one or few mineral elements that can be easily taken into the plants, therefore greatly reducing the necessity for the use of agro-chemicals. However, it should not be used with alkaline chemicals.

In the US there is a growing organic and sustainable supply source from an emerging char production industry allowing a reduced dependency on limited expensive agrichemicals. Wood vinegar is a high density liquid with good economic freight costs versus coverage that fits into existing supply chain and on-farm infrastructure. The extensive use of wood vinegar for agriculture in many geographical regions for many decades and specific positive trial results prove wood vinegar has the potential to reduce farm input costs while improving production results.

#### Application Notes

There are many varied possible uses for wood vinegar. The following points based on farmer experience are noteworthy:

- As a penetrant wood vinegar improves plant uptake so the volume of the existing (more expensive) chemical can be reduced and replaced directly with wood vinegar resulting in better results than the existing chemical alone with the same or lower input cost.
- Wood vinegar used alone as a stimulant for seed germination has shown improved strike rate and time for varied species.
- Wood vinegar shows beneficial plant health at lower rates but at increased concentration can also show detrimental effects to the plant health; therefore, it should always be used diluted. Furthermore the strength depends on foliar or soil application and frequency of application.
- Long term regular use has shown signs of much improved plant health and natural protection against pathogens.
- It is important to achieve the correct balance of application formulation and frequency to maximize the desired outcome.

#### Advantages and Benefits of Wood Vinegar as Fertilizer

- Improves absorption through the roots.
- Stimulates plants and vegetable growth.
- Strengthens roots and leaves.
- Increases the quantity of useful microbes.
- Increases soil microbial weight.
- Increases plant uptake as a penetrant - 1:500 of dilution water.
- Increases crop resistance to adverse conditions.
- Improves tree health: darker green leaves for better photosynthesis, thicker and stronger stems, higher growth rates, naturally more resistant to disease.
- Improves fruit quality and increases sugar content in fruit, and stimulates development of crops by preventing nitrogen levels and improving plant metabolism.
- Improves flavor, color, firmness and preservation of fruit.
- Works as flavor enhancer for agricultural end products. Mix solution rates of 1:500 to 1:1000.
- Strengthens the photosynthesis by increasing the content of chlorophyll of the plants.

- Reduces the need for fertilizer or other agrochemical volume used with better yields in viticulture and grain crops.
- Allows better uptake and a reduction of up to 50% use of fertilizers, herbicides and pesticides. As a foliar spray, dilute one part wood vinegar with 200 parts water and spray it to leaves once a month. Dilution ratio can be changed to 300 parts water for the succeeding applications.

#### Advantages and Benefits of Wood Vinegar as Pesticide

- Repels pests, prevents plant infection from fungal, bacterial and virus-like disease.
- Inhibits virus and soil disease when mixed in high concentration.
- Repels insects on plants (or deodorizer). Dilute one part wood vinegar with 20 parts water and spray the plant or the substrate for odor removal.
- Prevents diseases caused by bacteria.
- Reduces odor. Use wood vinegar solution of 1:50 to reduce the production of odor-causing ammonia in animal pens.
- Repels houseflies. Dilute wood vinegar at a rate of 1:100 and apply to affected areas.
- Repels nematodes. Apply wood vinegar solution of 1:500 to the base of plants.
- Preserves corn.
- Controls fungal diseases. Spray wood vinegar solution of 1:200 onto leaves.
- Controls root rot. Apply solution of 1:200 to the base of plants.
- Reduces incidence of chili pepper flowers aborting. Spray solution of 1:300 onto leaves.

#### Advantages and Benefits of Wood Vinegar to Enrich Soil

- Enriches soil fertility. Sprinkle diluted solution 1:200 on the soil before planting. Application is one liter solution for every square meter of planting area.
- Enriches garden soil. Use a strong solution of 1:30 to apply to the garden soil surface at a rate of 6 liters of solution per 1 m<sup>2</sup> to enrich the soil prior to planting crops. To control soil-based plant pathogens, use an even stronger rate of 1:5 to 1:10.

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## Sorrel Part 1

### History and Introduction

By Justin B. Reynolds



Sorrel (*Hibiscus sabdariffa*) is known by many local names throughout the world and even within the subregion. In the British colonies in the Caribbean sorrel is the common name, and this must come from the fact that European sorrel and Caribbean sorrel have the same tasting lemony tart leaves. I have

heard Mennonites call it "Red Bell," Americans, Canadians, and Europeans call it "Hibiscus," Australians call it "Roselle or Rosella". In Spanish, the name is Flor de Jamaica and this begins to tell us the story of how sorrel came to this area of the world.

It is likely that slaves and their traders from East and West Africa were the primary disseminators, originally landing in Jamaica and spreading out from there wherever cotton, sugar, and fruit plantations were demanding labor - hence the reason the Spanish call it Flor de Jamaica (flower of Jamaica). Also belonging to the same family (Mallows) as native cotton, you could imagine it showing up on many plantations throughout the Americas and worldwide in the side garden, similar to how many people grow a few plants in their yards today for personal use. Like many Belizeans it does not tolerate any kind of cold and grows only in the tropics.

The same amount of labor to pick cotton goes into picking sorrel, if not more because the plant is three times as tall and has five times the "fruits". That is only half the battle because the seed still needs removal. Unfortunately, there is no sorrel gin invented as of this writing although a Jamaican man named Turner does have a deseeding machine available to rent only in Jamaica. In reality, if you ever grow anything above 1 acre you are dealing with a bit of madness that can be tempered only with the cool calming drink from sorrel on a hot summer day.

Wine from sorrel is something distinctly Caribbean. In Belize many from the south with Garifuna heritage can



probably remember their granny making some wine to put up for Christmas consumption. From my youth, my Belizean granny Ms. Amelia Morris from Seine Bight had probably 25 plants; every Christmas they would be flowering and full of fruits for as long as I can remember. She always has some buckets of wine going at Christmas and always sold out.

I have spoken to many people familiar with sorrel in their homeland who have never experienced the wine. Mexicans and others in Latin America are more likely to drink non-alcoholic Aqua/Rosa de Jamaica juice sold year around made from dried fruits. Mexico is a net importer of sorrel purchasing US\$50 million of dried sorrel from Nigeria in 2017: 1,983 full containers. Of note, a 2018 purchase was rejected due to contamination and Nigerian imports were subsequently banned by Mexico; that ban has been lifted as of this writing. There are an estimated 15,000 sorrel farmers today in Nigeria.



Belize likely cannot compete in the production of dried sorrel fruits due to the relatively high cost of labor. Even Bowen & Bowen imports sorrel concentrate for their stout. Australia has had success exporting whole fruits in simple syrup to put in champagne flutes. In Malaysia, where sorrel is the state flower, friends have told me of eating the fruits as a snack, simply dipped into honey, which cuts the acidity; chutney and preserves are other sorrel value-added products. Another amazing fact about sorrel is the leaves contain nearly all the same amino acids as the fruits. In South East Asia these leaves are often added to salads, sautéed, or added to soups to add tart lemony citrus flavor. In Africa a vegan meat substitute is made by fermenting the pulverized seeds. The seeds have also been known as a poor man's coffee substitute when ground. China is the number one world producer of sorrel; they focus on growing the branches for paper and burlap, similar to hemp. 100% of the plant has uses; did I mention hibiscus oil from the seeds is a secret ingredient in many hair loss prevention products?

Interestingly there are approximately 10 varieties of sorrel in Belize, which we have planted and worked with, each of which bears fruit at specific times, which ultimately helps the harvester. If you plant one acre of the same variety, you will need help at harvest and also a ready market for your product because with the entire crop fruiting all at once, you will have a 'red wave'. If harvested consistently every 2 weeks, each plant is likely to



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produce a minimum of 3+ pounds of fruit, in 2 or 3 cycles depending on when planted. I was once told that August was the best month to plant and that might be correct for Belize. June during the first sustained rains, is the best time to begin planting, with seeds about 5 or 6 feet apart. First flowers appear at the equinox in September, and first fruits in mid-October depending on the variety selected. The challenge with this timeline is mildew on the leaves related to heavy rains in October and root rot nematode where the soil is not well drained. The flowers taper off around Christmas and a few fruits continue through January. What I have found is that a second planting closer together around 2 ft with the harvested seeds from the first crop in October yields a great crop from February into April, leaving a better opportunity to dry extra fruits. You need to be sure when your variety is expected to fruit. The "local" pale pink fruit doesn't fruit until Christmas whether you plant in June or September. A quick trick to knowing your variety is by the color of the flower. The white flowers yield lighter fruits and deeper pink flowers are signs of deeper red to even dark purple fruit. Also, the stems of the plant of the lighter fruits are speckled green and red, while the deep red fruits can have stems that are almost reddish-black. Each fruit tastes different just like the many varieties of grapes used in traditional wine making.



Plant as you would corn in a milpa with a stick, about 1.5 inches deep and leave the seed uncovered; you will have a sprout in less than a week. Scattering on open dirt works also. Surprisingly, hibiscus will grow and thrive directly out of the sand! I have seen this with my own eyes in Hopkins 100 feet from the ocean. Once you get one plant in the ground you have enough seeds to start your own sorrel empire. Happy planting. Sorrel is so beautiful when its in peak bloom. In Part 2, we will talk about why sorrel is so good for your health. We could probably fill up the whole issue talking about sorrel's health benefits so we will leave that until the mid-August issue of The Belize Ag Report.

#### **Editor's Note:**

*Having spent 33 years of vacationing in Belize, Justin Reynolds knows sorrel well. You can find out more about his Swirly Head Fruit Wines by visiting [www.sorrelwine.com](http://www.sorrelwine.com) and learn a bit about the magical place in Unitedville where he grows sorrel and the wine is made.*



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# Agriculture Prices at a Glance- \$\$\$\$\$\$

MARCH 2021

A-B denotes the difference between 1st preference & 2nd preference and sometimes between wholesale & retail and bulk or small amounts.  
Trend (H) means Higher over last 30 to 60 days (L) Lower (S) Steady. A blank symbol (-) denotes that the item is either not available now or at the time of the last issue.  
Prices intend on being farm gate in Belize dollars - usually price per lb

BELIZE CATTLE by District - Provided by BLPA						
	T	Dist.	Per lb	Dist.	Per lb	Per lb
Fattened steers	H/H/H	Czl	1.60	OW	1.55	Bze 1.50
750-1100 lbs	H/H/H	Cy	1.65	SCr	1.40	Tol 1.55
Weaner steers	H/H/H	Czl	1.45-1.65	OW	1.45-1.65	Bze 1.45-1.65
"	H/H/H	Cy	1.45-1.70	SCr	1.45-1.60	Tol 1.50-1.65
Breeding heifers	H/L/H	Czl	1.40	OW	1.40	Bze 1.45
"	H/H/H	Cy	1.40	SCr	1.45	Tol 1.40
Cull cows	H/H/L	Czl	0.90-1.10	OW	1.00-1.15	Bze 1.00
"	L/H/H	Cy	1.00	SCr	1.00	Tol 1.00
U.S. CATTLE						
U.S. price - corn fed - 1000-1200 lbs			H	US\$ 1.18		
U.S. price - feeders 600-800 lbs			L	US\$ 1.35		
BELIZE HOGS - Provided by Belize Pig Council						
Weaner pigs - 25-30 lbs - by the head			H	80.00-110.00		
Butcher pigs 160 - 230 lbs, per lb			H	2.00 1.80		
BELIZE SHEEP						
Butcher lambs - live per lb			L	2.25 1.85		
Mature ewes - live per lb			S/H	1.75 1.35		
BELIZE CHICKEN						
Wholesale dressed, per lb (Sp Lkt)			S	2.36 Large Birds 2.24		
Wholesale dressed, per lb (Bl Crk)			L	2.24		
Broilers - live per lb (Sp Lkt)			S	1.10		
Broilers - live per lb (Bl Crk)			S	1.20		
Spent hens (Sp Lkt)			L	0.70 / lb		
Spent hens per 4 lb bird (Bl Crk)			L	3.25 or 0.80 / lb		
CITRUS						
Oranges per lb solid, estimate only			-	1.74 pps (10.26 box)		
Grapefruit per lb solid, estimate only			-	4.04 pps (15.74 box)		
COCONUTS						
Green Coconuts, bulk			S	0.30 - 0.60 / per coconut		
Dry Coconuts, bulk			H	0.35 - 0.50 / per coconut		

\*\*\*These prices are the best estimates only from our best sources and simply provide a range to assist buyers and sellers in negotiations.\*\*\*

GRAINS, BEANS & RICE			T
Belize yellow corn, bulk (Spanish Lookout)	H	approx. 0.28, varies*	
Belize yellow corn, bulk (Blue Creek)	H	0.28	
Belize white corn, bulk (Cayo District)	-	price unavailable	
US Corn, #2 yellow	H	US\$5.46 / 56 lb bushel	
US organic, #2 yellow corn feed grade	H	US\$7.58 / bushel	
Belize soy beans (Spanish Lookout)	H	0.56 cash price	
Belize soy beans (Blue Creek)	S	0.48	
US soy beans	H	US \$14.30 / 60 lb bushel	
US organic, #1 feed grade soy	H	US \$20.76 / 60 lb bushel	
Belize milo (Spanish Lookout)	-	price unavailable	
Belize milo ( Blue Creek)	S	0.21	
Red kidney beans (Spanish Lookout)	L	\$120.00 / 100 lb bag, for export	
Red kidney beans (Blue Creek)	-	N/A	
Black eyed peas (Spanish Lookout)	H	0.90	
Black eyed peas (Blue Creek)	-	N/A	
Paddy rice per pound (Spanish Lookout)	S	0.40-0.50 farm price, dried	
Paddy rice per pound (Blue Creek)	H	0.50 farm price, dried	
SUGAR/HONEY			
Sugar cane, ton, Final 2020 price	H	\$54.75	
Bagasse, per ton	-	0.49	
Honey, 5 gal (approx 60 lbs)	S	\$240.00 (CQHPC)	
Honey, specialty, 5 gal (approx 60 lbs)	S	\$250.00 (Cayo)	
SPECIAL FARM ITEMS			
Eggs - tray of 30, farm price	L/L	5.00 (Sp Lkt) 5.25 (Blue Creek)	
WVD milk/lb farmer base price, contract only	S	approx 0.51-0.54** cheese milk 0.41	
Raw milk (farmer direct sales)	L	5.00 per half gal	
CACAO			
Cacao beans Organic /lb	-	price unavailable for dried fermented beans	
Cacao beans Organic /lb, TCGA	H	0.85-1.00 wet beans***	
US Cacao beans, metric ton (ICCO)	H	US\$ 2,443.29	
*Corn prices are very fluid caused by lower than usual inventory.			
**Western Dairies is purchasing only 90% of contract farmers milk.			
***Approx. 6,600 lbs of wet beans will yield approx. 1 MT of dried fermented beans.			

\*Corn prices are very fluid caused by lower than usual inventory.

\*\*Western Dairies is purchasing only 90% of contract farmers milk.

\*\*\*Approx. 6,600 lbs of wet beans will yield approx. 1 MT of dried fermented beans.

## Belize's Dairy Industry Recent Challenges and Looking Forward By Beth Roberson



Thiessen Dairy, Spanish Lookout

Many believe that the Belizean dairy sector could meet all of the country's dairy needs in the near future. Belize is fortunate to have a strong dairy industry, with 281 dairy farmers and 8 processors. However, importations of dairy products, often subsidized in their countries of origin, complicate growth of this sector.

Orange Walk District presently has the most individual dairy farmers in the country, with 225 in Shipyard and Little Belize combined. Cayo District is 2<sup>nd</sup> with 56 dairy farmers, the majority of whom are in Spanish Lookout and a few in Duck Run, Santa Elena and St. Margaret's. Toledo District has 1 in Blue Creek. All together they supply approximately \$9,182,400. of milk products to the local market per annum. Additionally, Belize's largest dairy producer, the HACCP certified Western Dairies, recently exported some items, including ice cream, to CARICOM. Their milk, cheese and butter are exclusively sold in country.

A costly learning curve was unfairly imposed on the local dairy sector during the COVID panic, when with the good intention of improving food security, Belize over-imported dairy products, including milk processed with Tetra Pak technology. These imports from Mexico and the USA, who subsidize their dairy industries, created an oversupply here. This glut and the complications of retailing fresh dairy products during the early COVID days led to huge losses for our dairy producers; several were forced to throw out up to 20% of their fresh milk for a short time\*, and some farmers even sold some of their dairy animals. Would increasing the national herd and limiting dairy imports lead to greater dairy food security? Key members of the dairy community have held dialogues with the Ministry of Agriculture. Having shared respective goals and needs together, the GOB and the dairy sector feel encouraged that Belize's dairy industry can move forward towards their goal of meeting all the country's dairy needs.

Food security for dairy products is unlike that of other commodities, such as corn or beans, which have annual or semi-annual harvests. Dairy has a constant year around harvest. If Belize wants to have dairy products which don't require refrigeration until opening, then perhaps local Tetra Pak processing should be considered.

The technology for Tetra Pak was developed in Sweden and Tetra Pak has grown to be the world's largest food packaging company. In the mid-1940's they developed a system known as aseptic packaging; Ultra-Heat Treated (UHT) products such as milk, and the packaging are separately sterilized, and afterwards combined and sealed in a sterile atmosphere. This differs from traditional canning where product and package are combined and sterilized afterwards. They are said to last for up to 6 months unrefrigerated while unopened.

One of the larger challenges and concerns with Tetra Pak systems is recycling. Since the packages have various layers of paper, plastic and aluminum, recycling cannot be done in standard recycling plants.

Other dairy processing updates: Consumers should read the small print on items such as evaporated and condensed milk cans. Because dairy fat is one of the more valuable fats, many processors have substituted palm oil/palm fats for the milk fat! This has been ongoing for several years, but until recently there were at least a few hold-outs preserving all dairy ingredients in these dairy products. Alas, while researching this article, the author could not find one evaporated or condensed milk with its own dairy fat. Reading labels is increasingly important; even so, it's difficult to comprehend what some items actually are, such as "filled milk" and "other solids" listed on some dairy products.

Some alarming new products are under development by the tech giants who support the replacement of cattle, which they claim are ruining the earth. A new company, Biomilk ([www.biomilk.com](http://www.biomilk.com)) is working to create a version of lab-cultured human breast milk. Bill Gates is an investor.

\* As of our print time, Western Dairies in Spanish Lookout is able to purchase only 90% of their contract farmers' milk. Individual farmers must use the rest of it as they can: home processing etc, or apply the 'excess' milk to their fields; unprocessed milk is a very beneficial but costly addition to the soil microbiome.

### Dairy Cattle Prices - March 2021

- 3 day old calves: Males \$100; Females \$250. - \$400.
- Yearling heifers: \$1,200. Basically N/A
- Breeding age heifers / bred heifers: \$4,000. - \$4,750.
- Young producing cows: \$4,000. - \$5,000.
- Cull dairy cows: \$1.15 / lb



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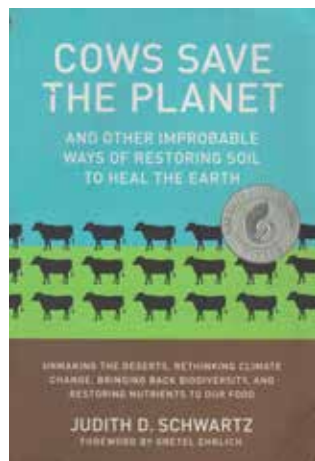
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# Cows Save The Planet And Other Improbable Ways of Restoring Soil to Heal the Earth By Judith D. Schwartz A Review by Michael Richardson



Although it has the appearance of a livestock association publication, the book is about dirt. The book does touch on animal husbandry methods involving herd rotation that offset some of the harmful damage done to topsoil and surface water by massive cattle operations. However, the large part of the book is a readable, informative report on land-use practices that can turn things around on the slippery slope of soil degradation and depletion.

The book addresses “unmaking the deserts, rethinking climate change, bringing back biodiversity, and restoring nutrients to our food” while introducing the reader to real live people. The premise is that biodiversity starts in the soil. Paying attention to the health of the soil is critical to our journey into the future.

The downside of modern agriculture with its huge fields of monocrops, and the tons of chemical additives applied to generate high yields is not only the expense of the constant spraying, plowing, and poisoning but the long term damage of depleted, eroded, dead soil. However the damage is reversible; Schwartz made a series of real field trips, where she visited experimental farms and ranches and the book is her eyewitness account of success in reversing the loss of soil productivity.

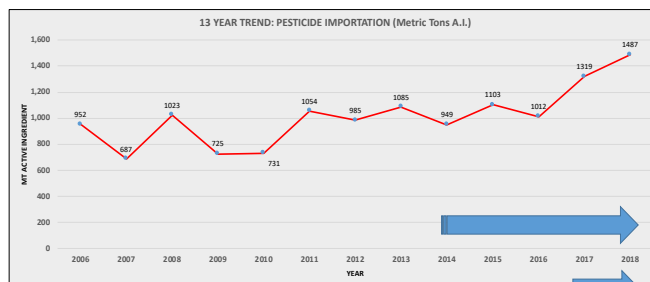
The book makes the case that upsets in the carbon cycle can change things in a big way. Human ignorance should not be part of the problem, argues Swartz; there should be an understanding how people and their organized efforts to provide food for themselves apply the opportunities nature provides rather than upsetting a delicate balance that puts us on an unsustainable path.

**Editor's Note Michael Richardson is a vegan, organic gardener who lives in the Cayo District in Belize. He serves on the Pro-Organic Belize Board of Directors.**

# Pesticides Review: Belize and Beyond By B. Roberson

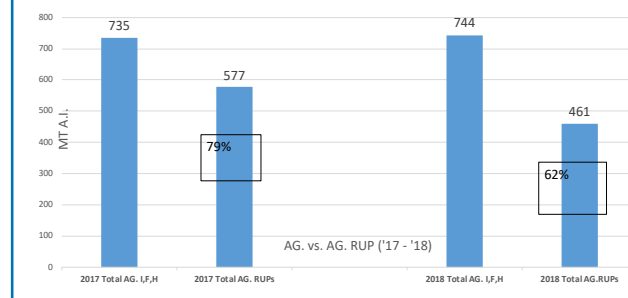
The charts below, courtesy of the Belize Pesticides Control Board (PCB), are a record of pesticide importation. The 1<sup>st</sup> indicates that there is a gradual increase in importations, calculated in metric tons of active ingredient (MT of A.I.), between 2006 and 2018. We do not have data correlating the acreages/potential changes in acreages under cultivation during those years.

## Total importation of pesticides and related substances regulated by the PCB ('06-'18)



The 2<sup>nd</sup> chart has some clearer good news, as it shows that even though the total imports of all classes of pesticides (insecticides, fungicides and herbicides) increased - slightly less than 1.5% between 2017 and 2018, the percentage of imports which were restricted-use pesticides (RUP's) declined from 79% of the total in 2017 to 62% in 2018. That is good news.

## 2017 – 2018 Agricultural Pesticide Imports (Insecticides, Fungicides, Herbicides)



PCB data for the years 2014 thru 2018 of the top 10 imported pesticides for those 5 year totals in MT of A.I. indicate that glyphosate

**Continues on page 25**

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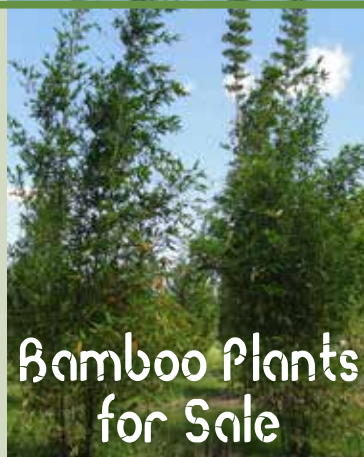
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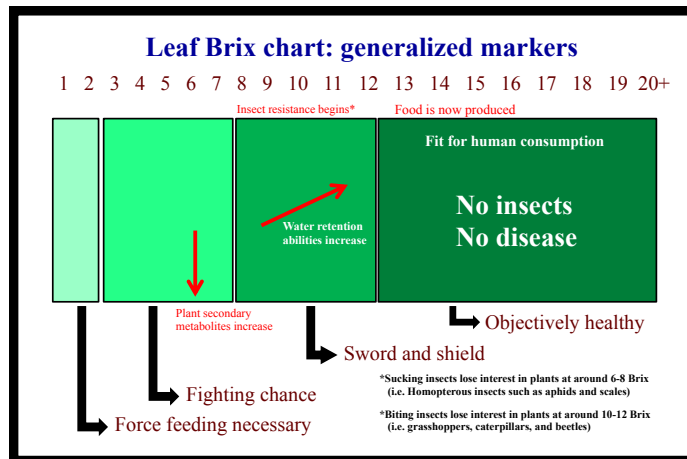


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# PICKY-EATER INSECTS PASS ON HIGH BRIX PLANTS

## Healthy Plants Are the Best Pesticide By Thomas M. Dykstra

Reprinted with permission from **ACRES**  
It originally appeared in their September 2019 issue #579.



### High Brix Crops Taste Bad to Bugs, But Are Optimal For Human Health

For many decades now, the magic number of 12, in regards to Leaf Brix, has been tossed around as the number to achieve if desiring to prevent insect pests from attacking your crop plants. Although not entirely accurate, it is a good starting point in which to begin a discussion.

This is not an article discussing Brix refractometers, how to use them, how to read them or even how to argue the merits of digital versus analog refractometers. I will assume that the reader is familiar enough with their use. But for those who are hoping to garner some additional talking points above and beyond the magical value of 12 Brix, then I believe this article can help.

Although refractometers are commonly used in the wine and citrus industries for testing grape and orange fruit sap, the notion of taking Brix readings from leaves finds more restricted uses among agricultural consultants and farmers in the know. Sometimes this is referred to as Leaf Brix in order to differentiate it from the more common usage of testing sap from fruit. The Brix charts circulating around the internet include both Leaf and Fruit Brix, so I need to be clear that my discussion will focus on Leaf Brix measurements.

First of all, one must understand, at some level, that insects do not attack healthy plants. Many people know this instinctively, but few have been told this explicitly. It is for this reason that knowing your Leaf Brix levels is crucial to knowing your crop, whatever you may be growing. High Brix (14 and above) means not just that insects will not attack a given plant, but that they will not even be attracted to the plant. In short, pest insects will pass over a high Brix field.

The converse is also true. Insects are very attracted to low Brix plants (6 and below). Unfortunately, if one uses insecticides to keep insects off plants, then it takes longer to realize this truth due to the insect indicators being repelled or killed. If you leave the insects alone, they will indicate to you the relative health of your plant. Now a logical, and seemingly heretical, conclusion to be drawn from this is that insecticides are totally unnecessary

for protecting high Brix plants. Financially speaking, excessive inputs reduce profit. Eliminating insecticides will increase a farmer's profit — this should be your goal.

But if the only important Brix value to know is "12," then what exactly is the purpose of having the other numbers? What types of information can be gleaned from Brix values of fourteen, or nine, or even five? For those who want to know something about their crop — immediately, right there on the spot — without having to send a sample away to some far-off laboratory, then you should be Brix testing on your farm.

The vast majority of Leaf Brix measurements will fall between 0 and 20. Therefore, I will restrict my analysis to those numbers. The Leaf Brix chart I have constructed is broken down into both general categories as well as more specific levels. The general categories include 1) those plants between 0-2 Brix, 2) those between 3 and 7 Brix, 3) those between 8-11 Brix, and finally 4) those between 12-20 Brix.

Generally speaking, if a full-grown plant falls between 0-2 Brix, it already has one root in the grave. Plants with Brix readings that low are removed from planet Earth with alarming efficiency. Insects will move in quickly to consume these plants and disease will run rampant in these plants that have essentially no immune system. These plants are unable to take care of themselves in a natural environment. If grown in an artificial environment, then they must be "spoon-fed" to survive.

For those who have ever played golf (not miniature golf), you have most likely walked on plants in this Brix range. Turfgrass cut that short, especially on the greens, has very little ability to effectively photosynthesize. Also, the prodigious amounts of pesticides sprayed on this same turfgrass through the sprinkling systems will indirectly prevent substantial root growth making it difficult for the plant to store nutrients. If not continuously fed and watered, turf below 2 Brix will turn brown in a matter of days. Diverse insect groups will be attracted to it and will assist in the very natural demise. Spraying insecticides helps to hide the insect presence and daily watering with synthetic fertilizers will be just enough to keep the turfgrass alive for one more day. These plants are being spoon-fed; their existence depends on it.

The next general category is substantially different. Those plants with Leaf Brix readings between three and seven have a fighting chance at survival. Many of our crop plants are between 3-7 Brix and are in considerably better condition than plants below 2 Brix. These plants require neither a daily dose of pesticide nor a daily dose of fertilizer. A farmer may only spray weekly or even biweekly, depending on the Leaf Brix values, in order keep the crop alive. Most of the agricultural plants I have tested, perhaps 75% of them, fall within this range.

To be sure, these plants are struggling. They have enough inherent ability to get by and can even provide for their own basic needs, such as the production and storage of sugars. But they will not thrive. Size, health, and yield will all be compromised.

Once most plants reach 6 Brix, there is a significant jump in the production of secondary plant metabolites. Secondary plant metabolites are the phytochemicals that help contribute to a plant's odor, color and taste. In addition, some secondary plant metabolites provide natural plant defenses against pests. These 6 Brix plants are finally able to devote their energy reserves into producing new proteins and diverse molecules. At five Brix and below, plants produce tasteless leaves, exhibit dull coloration, and boast fruit with minimal odor signatures. For example, if you

*Continues on page 30*



## Pesticide Review...Continued from page 23

was by far the most imported pesticide in Belize. The top 4 pesticides were:

• glyphosate	846 MT A.I.
• mancozeb	553 MT A.I.
• chlorothalonil	232 MT A.I.
• atrazine	141 MT A.I.
Total of all 10	2,405 MT A.I.

At PCB's stakeholder meeting in spring of 2020, they revealed that glyphosate was still Belize's #1 import in 2019. That same year, 2019, PCB announced that they had altered glyphosate's classification and declared it a restricted-use pesticide, defined as: "A pesticide which, if used in accordance with a widespread and commonly recognized practice, may generally cause, without additional regulatory action, unreasonable adverse effects on the environment, including the applicator and other people." (The definition is from The Pesticides Control Amendment Act, 2002, which aligns Belize with criteria established in 2008 by Food & Agriculture Organization/World Health Organization (FAO/WHO)). On PCB's 2019 updated list of 94 pesticides classified as RUPs, there were 16 trade name products which had glyphosate listed as their active ingredient (17% of total RUP's). PCB offers courses frequently (English and Spanish) for individuals who wish to secure a license enabling purchase of RUPs. PCB also specifically noted at the time of releasing these new classifications that glyphosate use "as a ripener in sugarcane and for weed control in public areas is expressly disallowed." (Belize Ag Report, issue 42, *Reducing Reliance on Highly Hazardous Pesticides in Belize* by Miriam Ochaeta-Serrut of PCB.)

The next issue of the Belize Ag Report will include more comprehensive and up-to-date information from PCB; it will include data from 2019 and 2020.

Mexico, our northern neighbor, made landmark pesticide news in Dec 2020/Jan 2021. Glyphosate imports were banned there in 2019 by the previous leader, with the transition period lasting until Jan 2025.

Current President Andrés Manuel López Obrador moved the country further in a regenerative direction by announcing an immediate ban on "permits for the release of GM maize seeds to protect the country's food security and food sovereignty, its native corn and their traditional cornfields (milpas)" (navdanyainternational.org, Jan 2021). GMO corn imports will also be transitioned out, ending imports no later than Jan 31, 2024. The use of GMO maize in food is also mandated for a simultaneous phase-out, as it is known to be farmed with agro-pesticides. The US, the largest supplier of corn to Mexico, was very unhappy at these announcements; however, the US can still sell non-GMO corn to Mexico.

The USA's Environmental Protection Agency (EPA) has a comment period ending mid-March, for the public to submit comments regarding banning or restricting glyphosate. The EPA has falsely claimed that "glyphosate used on crops grown for human and animal food has no impact on endangered species". <https://childrenshealthdefense.org/defender/glyphosate-endangers-wildlife-EPA-ban-it/>

El Salvador's legislature voted to ban glyphosate several years ago, but it 'stalled' as they did not follow through with legislation to enact it. Peru joined Mexico shutting off entry to GMOs in Jan 2021. Barbados and St Vincent and the Grenadines have banned glyphosate importation and Costa Rica has banned its use in national parks. Brazil has ongoing litigation.

Of note worldwide, the FAO of the UN announced in fall of 2020 that they planned to "partner with CropLife International", which is a global trade association representing the interests of companies that produce and promote pesticides, including highly hazardous pesticides (HHPs). Members include BASF, Bayer Crop Science, Corteva Agriscience, FMC and Syngenta. CropLife's purpose has been described as "advocating for continued use of pesticides which pose deadly obstacles to transition to innovative knowledge-intensive ecological approaches to farming". Over 350 organizations in 63 countries immediately protested. Many respect FAO's strong work advocating for small farmers worldwide and question why they have proposed this partnership.



# NOTICE

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# Technological Solutionism Will Not Save our Food Systems

By Navdanya International



Today, thanks to the Coronavirus crisis, the rotting of our current world structures has come further into evidence. The pandemic, compounded with an already ongoing climate and ecological crisis, as well as ballooning social inequalities, has placed us at a juncture. **On the one hand, we have the opportunity to truly foster an ecological approach to food and agriculture, taking into deep account the web of biodiversity, food sovereignty, and local food communities, to help foster and protect Earth and human health.** This transformation is possible through agroecological and organic approaches, which use biodiversity in food systems to provide resilience. **Or, on the other hand, we can follow the current international trend to continue the concentration of industrial agriculture and convergence of digital and financial technologies to vertically integrate the entire food chain – from seed to table – rendering our food systems more vulnerable overall.**

Although most international actors agree that our current food system is broken, not all agree on how this call for 'food systems transformation' should go. Now, the COVID public health crisis and its resulting economic devastation have accelerated calls to respond through the 'Great Reset' of capitalism through embracing the fourth industrial revolution[1]. **For food systems, this would mean a 'food systems transformation' where all areas of the food supply chain are further centralized, digitized, and mined for data in the false names of 'public health' and 'economic recovery'.** This push is now being supported by international organizations and world leaders who stand hand-in-hand with big corporations' desires for further agrifood system concentration. For example, in January 2019 several agricultural ministers, in conjunction with the FAO and other proponents for industrial agriculture (Green Revolution Forum, the World Bank, OECD, CTA, and others) drafted a proposal to create the International Digital Council for Food and Agriculture to consolidate all agricultural data to be mined from farmers (ETC Group 2020). A platform that the new FAO Director-General Qu Dongyu, stressing the importance of partnership with the private sector, has invited agri-tech company CropLife to join in a letter of intent to move toward a digital food systems transformation[2]. Such partnerships and strategies will inevitably allow for further control over every aspect of the food supply – through the production, distribution, and consumption chain – as has always been sought out by agribusiness' monopolistic intents.

Practically, this translated to a more aggressive push toward false solutions of farms managed through artificial intelligence and predictive algorithms, precision farming, fake foods- such as lab-grown meat, synthetically produced oils, and breastmilk-robot pollinators, biofortification, gene drives for more advanced forms of GMOs, and digital sequencing genetic information (DSI) of agro-diversity. These supposed technological advancements to the biodiversity, nutrition, hunger, climate, ecological, and health crises are being touted as the new 'smart' and 'innovative' solutions for our food systems. **But in actuality these 'solutions' are no such thing, as they are still, in the end,**

**pushing us toward a further iteration of the industrial agricultural system which created these multiple crises in the first place.**

## Philanthrocaptialism's False Solutions

**Embodying and actively supporting these false solutions is philanthrocapitalist Bill Gates.** Thinly veiled behind a heavily curated PR rhetoric of humanitarian generosity, such as increasing nutrition for the world's poor or providing solutions to climate change, he is in fact behind the further centralization and commercialization of food and agriculture through the promotion of the above-mentioned technologies. Since chained to the Bill & Melinda Gates Foundation's million-dollar grants are private market interests in commercially marketing these 'solutions'.

**His industrial and Green Revolution agricultural agendas around food and seed have come to slowly invade the international development juggernaut-from international research institutions, international organizations like the Consultative Group on International Agricultural Research (CGIAR) (of which he is the largest private donor[3]), and through his region-wide initiatives which influence state policy.** Beginning in 2007 with the African Alliance for the Green Revolution (AGRA), Gates has quickly moved to launch Green Revolution and industrial agriculture initiatives such as the Global Alliance for Improved Nutrition (GAIN) who promotes biofortification in the form of GMOs, Ag Tech, and Ag One in Asia, Africa, and Latin America which looks to digitize small-scale farming alongside the use of the commercial industrial agriculture model. Not to mention the thousands of million-dollar grants given to GMO research and commercialization (such as for various types of GM rice[4], Bt Brinjal[5], GMO banana[6], for example), gene

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drive technology for the extinction of pests[7], synbio produced food products[8] and to international institutions to lubricate international policy. All done hand in hand with big agribusiness companies such as Monsanto, Bayer, Syngenta, and Corteva[9].

A working strategy with these big businesses effectively accelerates the technology research-to-product pipeline which benefits only the largest private corporations in the form of marketable products. Something only possible through erosion of the legitimacy of international biodiversity agreements such as the Convention of Biological Diversity and its Nagoya protocol, for example. These international frameworks were made to protect our biodiversity and are being completely subverted through digital mapping of the seed genomes, directly leading to biopiracy. The convergence of information technology and biotechnology by taking patents through “mapping” genomes and genome sequences undermines farmers’ rights, as permission from the farmers is not needed once the genome has been digitally mapped. While living seed needs to evolve “in situ”, patents on genomes can be taken through access to seed “ex situ”.

Under the excuse of the COVID-19 emergency, we are seeing a fast-tracking of these technologies and strategies with little regard for their (known and unknown) social, ecological, or health effects. **While it has become extremely tempting to look for immediate solutions to these crises frantically, and therefore blindly, in reality, these false solutions embody a solutionist mentality which believes technology is the single mechanism to solving complex problems. In actuality, this relies on a heavy denial and amnesia of how agricultural technology, developed for the Green Revolution, has created and shaped these compounding crises, to begin with.** Ignoring these facts risks the further accumulation of negative feedback loops of endlessly trying to solve the problem that technological and industrial solutions created in the first place, leaving these unsolved structural problems that perpetuate further crises.

## Navdanya International

<https://navdanyainternational.org>

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## Overview of Long-Term, Jaguar Camera-Trapping Project In Belize

By Dr. Marcella Je. Kelly, Darby McPhail and David Lugo. All from Virginia Tech.



The jaguar (*Panthera onca*) is the largest wild cat in Central and South America. Culturally, the jaguar has a long history of importance as a symbol of power and beauty for

indigenous peoples and it is currently important economically, as a source of revenue to Belize through ecotourism. Ecologically, the jaguar exerts top-down control on other species and its position as an umbrella species has important ramifications for conservation of entire ecosystems.

The Belize Jaguar Project is a long-term camera trapping study started in 2002 by Dr. Marcella Kelly, professor, mentor, and renowned felid ecologist, making it one of the world's longest running jaguar studies. As a team of researchers primarily from the US, UK, and Belize, we study population dynamics of the threatened jaguar. We also track other felids (like pumas and ocelots), and their prey through remote camera photographs. The cameras are heat and motion triggered meaning that if any animal moves in front of our cameras, it will take a picture or 'capture' the animal in a photograph. We strive to benefit jaguar conservation in Belize (a stronghold for jaguars in Central America), by providing annual population numbers to assess whether the cats are decreasing, increasing, or are stable. We study how jaguars use the environment and are particularly interested in the potential effects of climate change and sustainable timber extraction on jaguar populations. We also study how the different species of wild felids partition important resources in order to coexist with each other. Our work contributes to conservation and management policies to protect this important species at the top of the food chain, and ultimately the priceless habitats in which they, and countless other wildlife species, live.



Through the use of remote cameras, we can identify each individual jaguar by its unique spot patterns and follow the individuals as they move across space from camera station to camera station, and through

time from year to year. Over the years, this project has surveyed the Chiquibul Forest Reserve (2002-2008), the Mountain Pine Ridge Forest reserve (2004-present), the Rio Bravo Conservation and Management Area (2008-present) and Gallon Jug, Laguna Seca, and Yalbac lands (2012-Present).

As an example of our findings, in 2018, we identified 59 unique individual jaguars in the 4 study sites (combined) north of the Western Highway. We cover such a large area with remote cameras that this translates into densities that are about 1.43-3.69 jaguars per 100 km<sup>2</sup>, perhaps lower than one might expect. But we have also found, somewhat surprisingly, that the cats display a large amount of overlap (including males) in the amount of space that they use. We have also found that the jaguar population appears to be stable indicating that even in sustainably logged areas, jaguars exhibit stable densities over time.

We support a diverse field crew with a volunteer and intern base made up of students from around the world that learn how to study jaguars via remote cameras and gain experience in wildlife conservation, as well as learn the complexities of predator conservation. We have supported numerous University of Belize interns from the Natural Resources Management Program, and have built lasting cross-cultural connections that have made this long-term, collaborative research project not only successful, but also lively and fun for the past 15-20 years. For long-lived species like jaguars, long-term research projects like this one allow discoveries not possible from single, snap-shot surveys. We hope for many new discoveries about jaguars and other wildlife in years to come!

## Rare Hummingbird Spotted Recently near the Belize Botanic Gardens at a Private Residence

By Gayle Zentz

In January/February of this year 2021 three persons witnessed the song of the rare **Black Crested Coquette** hummingbird. Two people actually saw the little hummer, which is a difficult task indeed due to the small size and quick hovering ability of the smallest bird in Belize. There are several of them in the near vicinity of the home of Gayle Zentz in the Cayo district near Succotz close to the Macal River; at least three people listed in this article have heard them singing early in the morning in this area. After contacting Cornell's ornithology department Gayle learned this is indeed a rare bird in Belize. Diego Cruz, a well-known tour guide and birder in the area, witnessed the tiny bird feeding on a heliconia flower and heard the songs at 6:30 AM. Another life-long birder and Professor of Ecology, Dr. Stephen Zitzer, also heard these birds singing between 6:30 and 10 AM. All determined it is almost impossible to photograph this bird as it is so small and darts so fast among the trees and flowers it is actually quite difficult to see. Gayle managed to capture the song of this little fellow on her phone and wants to send it to Cornell for their records. Currently Merlin, their bird app, does not have a song available for this tiny hummingbird.



**\*\*Anyone interested in seeing this Black Crested Coquette and adding it to their life list can contact Gayle at [zentzg@gmail.com](mailto:zentzg@gmail.com). If there is enough interest in this rare bird we may set up a date and time for a bird tour in the area. Let's hope they decide to make this their permanent home!**



# ***Cindy and Erica's Obsession To Solve Today's Health Care Crisis: Autism, Alzheimer's, Cardiovascular Disease, ALS and More***

**By Stephanie Seneff, Ph.D.  
A Review by Dottie Feucht**



The provocative exclamation “*By 2032, every other child born in America will be autistic!*” on the cover of the book is the alarm that makes the word *crisis* take on serious meaning. In novel form the book presents the details of biological systems that explain why autism rates are escalating continually in the U.S., the adverse effects of sunscreens and glyphosate, and the physiological processes that are derailed by statin drugs. Although studies that prove each fact are cited, the essence of the

points Dr. Seneff wants to make are told through the lives of two families in the novel whose friendship and daily lives are the feature of the story.

This is a very readable book. Cindy becomes interested in autism when her best friend Erica's two-and-a-half year old son, Sammy is diagnosed with autism spectrum disorder. The story unfolds with Cindy taking a keen interest in getting to the bottom of the disease. Her research takes her in many directions and she soon discovers studies that show that sulfate deficiency and excess aluminium exposure are important factors causing not only autism but many other diseases. She decides to start writing a health blog and most of the results of her research are presented in the blogs, which provide a convenient reference for readers. For example, one summary includes the facts that vaccines required in the U.S. in 1980 were 10 per child; in 2000 it was 32 per child, 18 of which contain aluminium which can cross the blood-brain barrier. Newborns in the U.S. and other developed countries receive 14.7 – 49 times more than the Food and Drug Administration (FDA) safety limits for aluminum just through their routine vaccines.

Aluminum is a very common metal, yet it has **never** been incorporated into any biological system, and is toxic to neurons. It is associated with brain changes that are seen with Alzheimer's disease. Dr. Seneff explains that this environmental toxin is present in many commonly used products like sunscreens, antiperspirants, antacids, and vaccines. The FDA does not require manufacturers to list it as an ingredient on the label of sunscreens because it is a contaminant from the manufacturing process. What harm does it do? When aluminum penetrates a cell in our bodies, it binds to calmodulin which prevents the enzyme endothelial

nitric oxide synthase (eNOS) from producing sulfate. Sulfate, an anion composed of a sulfur atom, is produced from reduced sulfur sources in the skin, catalyzed by sunlight, and combines with cholesterol to produce cholesterol sulfate. Therefore the overuse of sunscreen has played a dual damaging role, suppressing sunlight catalysis but also actively disrupting eNOS's sulfate-producing function due to sunscreen's aluminum content. (The well-known toxicity of other sunscreen ingredients to coral reefs and phytoplankton has resulted in many tourist destinations banning sunscreen in an effort to save coral and sea life.)

When aluminum or other toxic chemicals disable eNOS, it is unable to make enough sulfate to supply the needs of the endothelial cells, creating a systemic sulfate deficiency. The body tries to compensate for the deficiency by taking it from the gut (which can lead to Crohn's disease or colitis), the brain (which can lead to Alzheimer's disease or multiple sclerosis), the pancreas, (which can lead to diabetes or pancreatic cancer), or joints (which can lead to arthritis). Aluminum is not the only toxic chemical to cause a cholesterol sulfate deficiency. Glyphosate, the active ingredient in the pervasive herbicide Roundup, disrupts sulfate synthesis in the skin and disrupts bile flow from the liver, leading to a systemic deficiency in cholesterol sulfate. The gut, Dr. Seneff explains through her character, Cindy, is good at keeping aluminum out; however glyphosate disrupts the gut bacteria. The *tight junctions* between the epithelial cells lining the gut are no longer tight causing inflammation gut disorders. What's worse is glyphosate chelates aluminum and both can cross the gut barrier and carried around the body in the blood stream. But aluminum from vaccines, from direct injections, bypasses all natural barriers.

The story concludes with Cindy obtaining her PhD and writing a summary of her thesis which focuses on Alzheimer's. She concludes that prevention rather than cure is the solution. “All we have to do is to make sure that we get plenty of dietary cholesterol and dietary sulfur, and plenty of sunlight exposure to the skin. We have to stop eating processed foods and start cooking from *scratch*, using only organically grown ingredients.”

This book is important for all of us to understand how to maintain good health. It is especially important to farmers who use toxic chemicals. Sulfur, the fourth most important soil macronutrient after nitrogen, phosphorus and potassium, is seriously depleted in soil due to over-use of toxic chemicals – which means dietary sources of sulfur are also lacking. That is why maintaining organic matter in soil is so critical to producing nutrient-dense food.

***Editor's Note: Many readers will recognize Dr. Stephanie Seneff, as she and her husband visited Belize in 2017, to speak on the dangers of glyphosate. Her trip was organized by Pro-Organic Belize (POB). She spoke at several venues in Belize and Cayo Districts, and has expressed interest to return to Belize.***

***Thank you Dr. Seneff!***



### ***PICKY-EATER...Continued from page 24***

hold a tomato in the supermarket or out in the field and cannot detect any odor emanating from it, then that is a preliminary sign that it may be below 6 Brix.

Once a plant reaches a Leaf Brix of eight, the secondary plant metabolites have really started to kick in and natural resistance begins. In my experience, Homopterous insects, such as aphids and scales, lose interest in the plant that obtains a value of 8 Brix. In fact, it is relatively common for me to spot these insects on plants below 6 Brix. When a plant reaches 8 Brix, the aphids lose interest but other insects can and will move in to feed on the plant.

In certain circumstances, the presence of aphids can be an indication that only a part of the plant is below 8 Brix. Diseases characterized by physical “plugs” that prevent the flow of nutrients through phloem and xylem tissue are often manifested in trees by dead or dying branches. Insects will focus their feeding on these weakened branches and ignore nearby branches with seemingly healthy leaves and/or stems. It is for this reason that different parts of the same citrus tree can display different Leaf Brix readings when Citrus Greening takes hold and even more so during drought conditions when plugging of the vascular tissue is prevalent.

When plants ascend the Leaf Brix ladder and reach between 8 and 11 Brix, insects metaphorically “fall off” the plant because the plant has a metaphorical “sword and shield” that protects itself from insect predators. As a general rule, and although exceptions occur, sucking insects will not tolerate 8 Brix or higher. Chewing insects that eat the roots or leaves directly such as caterpillars, grasshoppers, and beetles, will start to lose interest in eating a plant once the plant reaches 10 or 11 Brix.

I have witnessed grasshoppers taking bites out of 12 Brix leaves and then flying off the plant. I have also witnessed immature caterpillars of the Fall Webworm stop eating the leaves of a pecan tree once the Brix is increased to 12. As a result, these caterpillars will form a dense clump and then slowly die of starvation within inches of healthy growing pecan leaves. Virtually all insects will not attack a plant at 12 Brix and this is why this figure is tossed around so commonly among growers.

Now variability is a hallmark of nature. Fluctuations between Brix readings can and do occur throughout a growing season. Even if maintaining Brix levels in a given crop, it is not unusual for the leaves to fluctuate 1-2 Brix from one week to the next. It is for this reason that the safest place for your plants to be is 14 Brix or above. In this way, one may be relatively secure that natural fluctuations do not take your crop below 12 Brix where it may become differentially attractive to various insect pests.

Although Brix is a measurement of dissolved solids, for our purposes it is the measure of sugar in plant sap. Sugar is the main product of photosynthesis. The more a plant photosynthesizes, the more sugar is contained in its tissues, and the higher the Leaf Brix readings will be. This sugar is produced in the leaves, and is not only stored in the leaves, but eventually descends to the roots as well. Depending on environmental conditions and the health of the plant, approximately 20-70% of the sugar (photosynthate) is expelled into the soil from the roots. This expelled sugar feeds the microbes that will, in turn, break down minerals and supply them to the plant. Therefore, high Brix plants will support a thriving subculture of microbes in the soil.

But sugar has another role. It is hygroscopic, meaning, it absorbs water. It may accomplish this by absorbing liquid water, such as from a spill, or by absorbing water vapor from the atmosphere, which can occur under conditions of high humidity. Either way,

the more sugar you have in the soil, the higher the soil's water retention. Hence, drought resistance and high Brix plants go hand in hand. Plants with a Brix of 4 might only contribute 25% of their photosynthate to the soil, but plants of 10 Brix may provide the soil with 40-50% of its photosynthate sugar and still have enough sugar to grow reasonably well. By the time a plant reaches 14 Brix, there is so much sugar being pumped into the ground from the crop that microbial counts can reach 20 million or higher in a teaspoon of soil. On top of the soil, these plants are not only drought resistant, but freeze tolerant as well since highly concentrated sugar water will not freeze above 26 F. Freeze warnings from the National Weather Service then become largely inconsequential to a grower.

Insects have a simple digestive system and cannot digest the same foods that we do. Low Brix plants are designed for the insect gut. They do not have the digestive enzymes to break down healthy proteins from high Brix plants, only the broken or incomplete proteins from low Brix plants. High Brix plants are meant for vertebrate animals, most notably humans. When we eat healthy plants, we augment our long-term health. When we eat low Brix plants, our long-term health is compromised, although the effects may take years to manifest.

Therefore, we should be eating high Brix food for our long-term health. If eating meat, then our animals should be feeding on high Brix plants. If continuously fed low Brix plants, our cows, our sheep, our goats and the like will display compromised health and suffer from various diseases and spontaneous miscarriages. It is only common sense to say that eating this unhealthy meat will then, in turn, compromise our own health.

It is important to repeat that this article refers to Leaf Brix only. There are other parts of the plant such as the fruit and the roots that often display different Brix readings when compared to the leaves. This is to be expected. But roots are hard to get to and measure. Additionally, testing roots is often destructive to an individual crop plant. Testing leaves is not only easier, but more consistent.

There are uncomfortably large fluctuations in both Root Brix and Fruit Brix readings throughout the season that make both of them difficult to decipher without the help of a specialist. Unless someone is very familiar with the differential readings from differing plant tissues, a farmer should stick with Leaf Brix first and foremost as the chief indicator. Comparatively speaking, Leaf Brix measurements remain much more consistent; hence, they are the gold standard when determining the relative health of your crop.

Insects recognize Brix levels better than we do. Insects are indicators. They indicate to us what plants are unhealthy to eat. If a codling moth caterpillar is in my apple, I am going to toss the apple. It is not worth eating. The insect has told me this by virtue of its presence. On the other hand, if insects are not present and no insecticides are being sprayed on the crop, thus allowing insects to choose, then this would be an indication to me that the crop may be healthy for my family to eat.

For those who are actively testing their crops with a Brix refractometer or have an agricultural consultant who is accomplishing the same, much information can be gleaned within just a few minutes about the current state of your crop. To be sure, there is more information that can be provided with further off-farm testing and at considerably greater expense. But in terms of an on-farm testing procedure, using a Brix refractometer is an inexpensive first step, and a wonderful one at that.

*Tom Dykstra is an agricultural consultant based in Gainesville, Florida.*



## The Many Faces of Flour

### Part 1: Traditional Wheat Flour And its Ancient Relative, Spelt

By Beth Roberson



Many folks don't believe that wheat can be grown in Belize, but it can. Barton Creek Mennonites successfully grew wheat in Cayo District, but alas, they did not successfully harvest it. That was done by their winged friends – birds, birds, birds, who ate more than their fair share. So, we remain a wheat-importing country, reliant on North American wheat berries and processed flours. Wheat crops are highly subsidized by the government up there. This increases the challenges for local start-up farms and businesses who would grow, process and sell local grains/flours and the products that would use them as ingredients. Some larger Latin economies heavily subsidize local flours – such as cassava flour in Brazil. This promotion and protection is not yet available in Belize, but may be considered under our food security/food sovereignty interests.

One alternative to wheat, perhaps the most popular here, is wheat's relative (same genus, different variety), *Triticum spelta*. Spelt, (aka dinkel wheat), was domesticated approximately 8,000 yrs. ago near the Black Sea (between Turkey and Russia). Traditional wheat was over-hauled during "the Green Revolution" of the 1950's and 1960's. Wheat's new hybrid dwarf varieties yield higher harvests, but with lowered protein and lowered nutritional profiles of vitamins and minerals, and which also require heavier fertilization. Now, decades later, many observe that countries whose diets are heavy in the hybrid dwarf wheat processed flours have increased metabolic problems in both adults and children, which include but are not limited to: obesity, diabetes, kidney problems, high blood pressure, and heart disease. Traditional North American wheat flour that is not organically grown is usually desiccated\* with glyphosate, a restricted-use pesticide (RUP) in Belize, which passes into the wheat grains.

Many local bakers here increasingly turn to alternatives such as imported organically grown spelt, which is higher in lipids (fats), protein, minerals and fiber than traditional wheat flour. Gluten: although spelt has a structure variation which could make it more digestible for certain non-celiac people ([www.perfectlyproduce.com](http://www.perfectlyproduce.com)), celiacs are urged to be cautious as *gluten is in all the wheats, including spelt, einkorn (AKA mother of all wheat) and emmer*.

You will find cooking and baking with spelt a fairly easy transition from traditional wheat flour. For example, you may need slightly more liquids/moisture with spelt and you may notice a slight change in the feel of the dough. Some say there is less kneading required. Begin by substituting around 25% of the total flour with spelt; see how you and your family like it. Depending on what I am baking, I use a varying combination of flours - up to 100% spelt. For pastry, my family prefers a combination of 50% whole wheat pastry flour and 50% spelt. The more spelt, the more "nutty" flavor.

Spelt is widely available in specialty and health food shops and in a few of the larger grocery stores.

\*Desiccation is the process of drying something; it makes crops dry faster and become "cleaner" thus easier to harvest with less "living debris".

Join us here at the Belize Ag Report as we work our way through both local and imported flours in future issues. Please send us your favorite recipes using spelt, and any alternative flours. We will post these on our upcoming RECIPES feature at [www.agreport.bz](http://www.agreport.bz) and credit you, of course.



## Flour – Essentials

### By Judy duPlooy

Confused about flour? What! We use it every day. We make tortillas, pancakes, bread, cookies, cakes - you get it. Yeah, you say, but what is *wheat flour*? Well, the flour you probably use to make all of those things listed above is actually *wheat* flour. The most commonly used flour is made from wheat berries that have been hulled, bleached and put through the mill.

Whole wheat flour is not the same. It is made from **whole** wheat and is far more nutritious than white flour because nutrients have not been removed in processing. It's not as light and fluffy as white flour but health-wise, it is far better for you.

So, is that the only kind of flour? Just to confuse us further, there is flour with gluten (rises better, makes lighter weight items) and then there is gluten-free flour (works better with baking powder than yeast). A lot of people are allergic to gluten and can't eat anything that includes it. And some people just feel better if they eliminate it from their diet.

If you don't have a gluten allergy or just want to eat less of it, try mixing white flour with a gluten free one if you want to get a rise out of your flour. Even mixing it with a flour that has less gluten, will lessen the density of your baked good.

Any grain can be made into flour by grinding it. At the Belize Botanic Gardens' Shop in the San Ignacio Market, we stock several grains and if you want them ground, just ask.

Has Gluten: Wheat, Spelt and Rye

Gluten-Free: Cassava, Plantain, Buckwheat, Oats, Brown Rice and Corn

Since we are promoting locally produced items, why not try cassava and/or plantain flours? And if you have recipes to share, bring us a copy and we'll pass them on.

### Cassava/Plantain Pancakes

1/2 cup each, plantain and cassava flour  
1-1/2 tsp baking powder  
pinch of salt  
2 oz healthy oil  
2 eggs  
1 cup yogurt, milk or water

Mix dry ingredients; beat eggs and mix with oil and yogurt, milk or water.

(You may need more liquid if you like thinner pancakes.) Cook on a hot comal.

Serve hot with whatever you like on pancakes. I like molasses and yogurt.

Let me know if you try it and what you think.

Belize Botanic Gardens Shop  
Plants  
Health Foods  
Bookings for Garden Tours

If you don't see what you want, ask for it.

# Global Seed Summit Report

By Mary Susan Loan



The Global Seed Summit was held via Zoom from November 17 – 20, 2020. The audience was comprised of home gardeners and small scale farmers from around the world. This free informational and inspiring event was sponsored by The Great American Seed Up and the Rocky Mountain Seed Alliance and hosted by Greg Peterson and Janis Norton, managers of Urban Farm Project. Both are devoted to teaching and mentoring gardeners and farmers on the how to's of sustainable agriculture wherever they live and grow fruits and vegetables. <https://www.urbanfarm.org/>. Urban Farm notes that, "over the last two decades 75% of the genetic diversity of agricultural crops has been lost...to GMOs and seed patenting." To help promote food security and prevent many seeds from going extinct, they endorse that the time is now to join together worldwide to preserve seed diversity.

The seed summit began with a presentation 'How and Why of Seed Libraries' by Hillie Salo, a long time master gardener and cooperative extension agriculture teacher in the Bay area of California. She is a passionate seed saver and founder of *Seed One Community*, with a mission to advocate and educate about inspiring ways to save and share seeds. Hillie has started several successful seed libraries which operate in the "retired" book catalogues, with seeds ready for growers to check out, grow, then return some seeds from the plants they have successfully grown. She advocates for agrobiodiversity to help keep heirloom and other seed varieties viable and supports growing many varieties of seeds to promote resilience. [RichmondGrowsseeds.org](http://RichmondGrowsseeds.org), [CoolBeansUpBeet!](http://CoolBeansUpBeet!) Blog, *One Seed One Community* and *Start-Seed-Bank* are resources she recommends. "Plant, save, share seeds" is Hillie's advice.

"You Can't Grow That Up Here!": *Seed Adaptation for High-Altitude Gardens and the Wild People Who Grow Them*, was led by Penn Parmenter, a farmer and seed saver, for decades who teaches adaptation to farming at an 8000' elevation in Colorado U.S.A.. [www.pennandcordsgarden.com](http://www.pennandcordsgarden.com). She and her family have learned to reap harvests in challenging conditions with a short growing season. Take away advice: "Every season is different" and "keep an open heart and mind wherever you garden or farm". She recommends keeping a book with drawings or photos of plants and garden plots with notes of production as well as challenges encountered from planting to harvest. Penn and her family save and sell seeds. Store seeds in a cool, dark and dry location in glass jars or foil packets all carefully labelled and dated is Penn's advice. She has learned by seed saving and gardening and growing seeds from year to year that many seeds have shortened their growing season as their adaptation to high altitude and cold growing conditions. "Seeds of Time" movie and

"Bioversity.com" are recommended by Penn to learn more about the art of saving, planting and growing seeds to harvest.

"Redefining Seed Sovereignty Across the Philippines" was led by Sherry Manning, founder of Global Seed Savers, [www.globalseedsavers.org](http://www.globalseedsavers.org) and a Facebook group [globalseedsavers](https://www.facebook.com/globalseedsavers). Sherry started an NGO as a Peace Corps volunteer from 2006 – 2008. She helped farming families develop their ancestral land into an organic farming and trading center, a youth environmental education center as well as a leading eco-tourism destination. To this day, Sherry remains committed to building hunger-free and healthy communities with access to farm produced seeds and foods. Her goal is to restore the traditional practice of saving seeds. Karen Lee Hizola, also a founder and director of Global Seed Savers, furthered the presentation; she has helped develop programs to teach Filipino farmers about low to no cost benefits of organic permaculture. Karen noted that 70% of the world food supply is grown by over two billion farmers who grow crops on less than two hectares of land. Only seeds that are open-pollinated and non-GMO and climate-resistant are shared by Global Seed Savers. Karen defines seed sovereignty as "a farmer's right to save seeds" and stressed that seeds are our past, present and future. She recognized the following as reasons for the estimated 32% + post-harvest loss of crops: high temperature, water loss for irrigation, physical damage and decay, problems with drying and storage, transportation. Karen furthered that indigenous wisdom and farming practices do not depend on export or excessive transportation costs. "In healing our intergenerational, historic, and unresolved trauma, we also heal the earth". Karen recognized that people of the world are interconnected with elements made of the earth. Saving seeds provides a free or low cost way for following the farming practices of our elders. She advised looking up on the internet, ECHO ASIA in Thailand. And International Institute of Rural Reconstruction (IIRR). Karen also explained the importance of trees as a vital part of sustainability and regenerative agriculture.

Bengult University in the Philippines has a seed bank which offers seed exchanges and seed swaps, which uses open-pollinated seeds that are free from chemical treatments. There is a Vimeo film of farmers that can be viewed at <http://vimeo.com/472301248>. She advises that control of seeds is tied to culture and that seeds connect us all to our past, present and future.

Bill McDorman, a founder, and now the executive director of the Rocky Mountain Seed Alliance has been gardening and teaching others about sustainable seeds saving and gardening for decades, including a course, "Never Buy Seeds Again; Seed Saving for Health and Vitality and Self Reliance". He recommended [seedsave.org](http://seedsave.org), The Living Seed Company, and a book *Breed Your Own Vegetable Varieties* by Carol Deppe. Bill recommended growing some plants until they dry or bolt to create seeds to save and grow. Some "grassroots" seeds recommended: kohlrabi, brussel sprouts, cabbage, cauliflower, broccoli and kale. "Seed Saving Myths" and "Seed Storage" were also presented by Bill. Note: At least ten times a year a seed saving class is held via the Urban Farm and led by Bill McDorman.

Beata Tsosie-Pena, creation manager for the "The Espanola Healing Foods Oasis and Healing Foods Library" – an ancestral way of nurturing the land, led a presentation about a group in New Mexico who transformed an area of non-productive land into beautifully landscaped demonstration gardens and a park using indigenous methods of farming using sustainable design. She is on the steering committee for The Traditional Native American Farmers Association.

*Continues on page 35*



## Rene Tzib Certified Pesticide-Free Farmer

By Dr. Sophia Clarke  
San Antonio, Cayo District



When driving from Cristo Rey into San Antonio through the Maya Mountain foothills, one is struck by the dramatic beauty of the area. From the road rich black soils with smallholdings are evident, and it is obvious that this is one of the most productive agricultural areas in Belize.

Rene Tzib is a Pro-Organic Belize (POB) certified pesticide-free farmer. He holds certification at the highest level (3) having had his produce laboratory tested, and declared free from pesticides

including glyphosate. Rene farms on 5 acres of family land in the San Antonio area, with good waer pressure\* and mostly black soils. His ancestors were among the handful of families of Yucatec Mazewul, who made the long trek to San Antonio during the Caste Wars in the Yucatan in the late 1800's.

Rene had organic farming training at Central Farm. He also worked for 5 years at Belize Botanic Gardens under Rudy Aguilar from whom he also accumulated organic knowledge. In addition to farming on the family land in San Antonio, he has kept organic vegetable gardens for Maya Mountain Lodge.

Farming in Belize in the last year has been challenging to say the least: COVID, the loss of produce markets driven by tourist lodges and snowbirds; Eta and Iota with high winds and floods; and recent shortages of quality seed. During November, Rene lost thousands of young vegetable plants. He also had to contend with a nasty injury sustained by an encounter with an aggressive billy goat. Despite all this, he has remained cheerful and has toiled away with 4 helpers to produce the well-ordered and very productive pesticide-free farm that I saw on my visit this week.

His farm is particularly known for growing superb cucumbers, cabbages, onions and cilantro, to name just a few. Lettuces, he says, are his number one best crop. I also saw lush fields of carrots, red kidney beans, coco-macal, papaya, guava trees (with fruit protection), Irish potatoes, zucchini, tomatoes, string beans,

chaya, peanuts, okra, habanero peppers, pitaya, black beans, lime and orange trees. All of these crops are grown in the open, which is no easy feat here in Belize.

Rene also bottles organic honey from the farm and his wife Emma makes delicious dark peanut butter as an added value item.

Rene is keen to share his expertise with others, and is anticipating that Central Farm will support him in teaching growers some organic techniques, such as the making of compost teas.

For the future, Rene is hopeful for funding for covered structures in order to extend his pesticide-free crops to include sweet peppers and to improve tomato production.

Now, more than ever, in the face of COVID, we need to be looking after our health and improving our immune systems. To this end, consuming pesticide-free produce is a no-brainer.



Rene sells his produce via POB at regular market prices or a little above market prices.

To order a box of pesticide-free produce from Rene (and other POB certified pesticide-free farmers), simply send your name, email address, and phone number, to [proorganicbelize@gmail.com](mailto:proorganicbelize@gmail.com). In the subject line insert the words "send harvest list" and either "San Ignacio" or "Belmopan" to indicate

where you would like to pick up. For full details, visit [www.pro-organicbelize.org/ordering.html](http://www.pro-organicbelize.org/ordering.html).

The weekly produce pick-ups in San Ignacio are at Hodes, and in Belmopan, at the Blue Moon Market. POB is planning with Rene to start a further collection hub for produce in Ladyville in due course.

\*Rene's water, from the San Antonio village system, is sourced from the Pine Ridge. We are told that it's the only village in Belize to have a non-chlorinated village water supply.

## Know Your Farmer - Know Your Food - Know Pro-Organic Belize



Pro-Organic Belize

Pro-Organic Belize - Educating both private individuals and commercial operations on the benefits and processes of sustainable, pro-organic and chemical free agricultural production

### Get involved

- Like and share our information
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- Become a Corporate Sponsor
- Volunteer for the Organization or an Event
- Become a Certified Farmer
- Join the Consumer Group
- Come to an Event or Speaker's Meeting



### Contact & Information

- Pro-Organic Belize Facebook Page for Events
- Pro Organic Belize Facebook Group for Open Discussion
- <https://pro-organicbelize.org/>
- 677-9658





# Breadnut - A Tool For Carbon Drawdown, Food Security And Land Degradation Neutrality

By Christopher Nesbitt  
Maya Mountain Research Farm

We can both mitigate and adapt to climate change by establishing multistrata agroforestry systems, a combination of trees and



*Breadnut seed.*

other plants that mimic the shape and function of forest. Such systems provide the important ecosystem services of atmospheric carbon drawdown, retain soil and soil moisture in the landscape, and provide habitat for animals. They also

provide fruit, fuel, fodder for animals, timber, marketable crops, medicinal crops and staple crops. A multistrata agroforestry system reduces vulnerability to the effects of climate change, such as floods or droughts, by being deeply rooted, and having the products and services of multiple species, including tropical staple trees.

Tropical staple trees are trees that can produce food that can be the foundation of our diets. *Artocarpus camansi*, known as "breadnut", *castaña* in Spanish, is one such tree. It has many roles: a canopy species, providing shade, it has excellent anti-erosion capabilities, and is a promising tropical staple tree. Breadnut, in the *Moraceae* family, is closely related to both breadfruit (*Artocarpus altilis*) and jackfruit (*Artocarpus heterophylla*) and distantly related to ramon nut (*Brossimum allicastrum*), which also shares the common name, "breadnut". Believed to have originated in Papa New Guinea where it is still widely grown, naturally occurring along rivers, breadnut was introduced to the Caribbean by the British in the 1700s. It is common in Guyana and Trinidad. It is present in Belize but is not widely cultivated and is underutilized.

Breadnut is one of the absolute champions of food security for the lowland humid tropics. A mature tree can grow to 70 feet tall, and give over 800 fruits per year, each one weighing around 1.8 lbs. Of that, up to 50% of the fruit is seed. That is a staggering 720 lbs. of food per year, per tree! Once established, the tree provides a lot of food with limited maintenance with a very favorable ratio of energy returned on energy invested. It fruits for several months, starting often in August or September and extending into April or May in Toledo. The seed is very nutritious, providing 13-19% protein and 6.2-19% fat. It can be boiled or roasted and eaten, boiled and dried and ground into flour, or cooked and mashed for animal feed. Ducks, chickens and pigs love cooked breadnut. It can also be dried and ground. Flour made from breadnut has a long shelf life, reportedly several years if properly stored. The pulp has little value as food, but makes excellent feed for raising black soldier flies as poultry food, or as feedstock for a biogas plant.

Breadnut is propagated by seed, and can be used as a scion for grafting other species onto from the *Artocarpus* genus, such as breadfruit, anjali and jackfruit. When the trees are less than two years old, they should be grown in partial shade. The tree grows

very rapidly, up to five feet per year and its spreading crown also expands rapidly. It is a plant that can handle short periods of flooding with no damage. Its large buttress roots help to hold soil in the landscape,



*Breadnut fruit on the tree.*

and spread a large distance. The roots do not tend to go very deep, but spread widely. Breadnut has great potential for erosion control and land degradation neutrality and reversal. Breadnut grows best in alluvial soils, but we have found it able to do well on degraded pasture land if the area where it was planted has had some disruption to the soil to loosen it. Breadnut is not entirely drought-resistant and does poorly in drought years. Evidence of drought-induced stress includes loss of leaves and smaller subsequent seed pods and seeds. Its spreading canopy of dense and large leaves reduces light reaching the ground. Once established there is not much that will grow well in the sub-canopy, being too dark for both cacao and coffee, for example.

Like all long-lived trees that will become a lasting element in our farms, care must be taken in its placement. A planting of breadnut at 25 feet x 25 feet would give you 70 trees per acre. At that density, by year 10 the canopy will be closed, very productive, but the trees will be in competition for light and soil. Your time spent weeding will drop off to nothing, but none of the trees will produce as well as they could if they had more space in the next few years. Monoculture plantations of breadnut tend to have a spacing of 35' x 30' - approximately 40 trees per acre. This could give a yield of up to 28,000 lbs. of edible breadnut seed per year. However, monocultures are financially and biologically unstable; a diversified system is better. A spacing of 75' x 75' is ideal for a multistrata agroforestry system comprised of many species as it provides flexible spacing, and allows for a high degree of intercropping. At that spacing, you would end up with 9 trees in an acre. By year 15-20, one could reasonably expect 9-12,000 lbs. of food per acre, per year from 9 trees, as well as any associated harvests from other species mixed into your multistrata agroforestry system, such as cacao, coffee, banana, vanilla, or any timber trees intercropped with the breadnut.

Breadnut is a useful but underutilized tree species that serves multiple roles for the farmer. It is a useful tool to have in our tool kit for food security, degraded land neutrality and climate change mitigation and adaptation.



*Breadnut buttress roots retain soil in the landscape. This tree is 25 years old.*



## ASK RUBBER BOOTS



Dear Rubber Boots,

What causes honey to become granulated?  
Does granulation mean the honey is spoiled?

Dear Honey Lover,

Granulated honey is not "spoiled." Granulation is a natural process in pure honey. King's Jungle Honey producer says they warm their honey to 140-145F to delay the granulation process when they bottle the honey. However the honey in the stainless steel bottling tank may sometimes be a few degrees short of the target temperature at the bottom of the tank at the time it is bottled. (There is commonly a bit of temperature stratification in the bottling tank from top to bottom, which can be remedied by stirring manually in the tank but they prefer not to stir because that entrains more air, resulting in more foam on top of the honey.) Speed of granulation is usually a function controlled by the ratio of the simple sugars, dextrose and levulose (or the minority amounts of complex sugars) in the nectar when the bees forage it from the flowers. The ratios vary depending on the floral source (s) of the nectar. It is easy to reliquify the honey by placing the container in a pan of very hot water on the stove long enough to heat the honey throughout and melt the crystals. The same can be accomplished in a microwave, carefully heating (with cap loosened).

Have you a suggestion for an article topic  
or have a finished article about Belizean  
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[www.mmrfbz.org](http://www.mmrfbz.org)  
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MayaMountainResearchFarm](https://www.facebook.com/MayaMountainResearchFarm)

## Belize Ramón Ox Group GROWING AGROFORESTRY AND FOOD PROCESSING

Oscar and Ana Moralez, the 2019 lady farmer of the year, established the Belize O'X Group to promote the use of the ramón or Maya nut. The nutrient-dense Maya nut was a staple food among the Mayas of yesteryear. Oscar and Ana are reviving that use in their agroforestry source of the Maya nut by processing the nut into many products including flour, coffee substitute drink, "orchata" drink, and chocolate drink. They also use the flour in baked goods that they sell. The Maya nut is high in fiber, calcium, potassium, folate, iron, zinc, protein and vitamins A, B, C and E. The ramón group is also cultivating the seed. The twelve members of the group have submitted the paperwork to the registrar of the cooperative department to register their group; they look forward to support from the GOB to expand their enterprise.



**Fruits, Roots, and Shoots - Using Tropical Plants for Self-Sufficiency** is a new book published by Deborah Harder. It is available in spiral binding from Deborah or Dottie Feucht [dottiefeucht@protonmail.com](mailto:dottiefeucht@protonmail.com) or in standard binding online from [www.amazon.com](http://www.amazon.com)



### Global Seed Summit...Continued from page 32

"Pollinators for the Garden", "Seed Starting" and "Basic Seed Saving" presentations were also included during the Global Seed Summit.

All the presenters are devoted to sharing the art of seed saving as well as planting trees as part of regenerative agriculture practices.

The Great American Seed Up, [www.GreatAmericanSeedUp.org](http://www.GreatAmericanSeedUp.org), is held to provide gardeners and farmers with a wide variety of seeds in a box for a fraction of the price of buying small packets.

It is recommended for gardeners and farmers to order together and share the cost of seeds.

When you sign up to the Urban Farming.org at <https://www.urbanfarming/>, you will receive information about workshops and an abundance of free gardening and farming information.

# AG BRIEFS



The Belize Ag Report salutes GOB on their new digital AgriBulletin. See ad below:



\*3<sup>rd</sup> July: Dr. Ed Boles, aquatic ecologist, will speak on improving waterways in Belize.

**Organic produce sales rose 14.2%** in the US in 2020, to over 8B US\$ as per Nielson data.

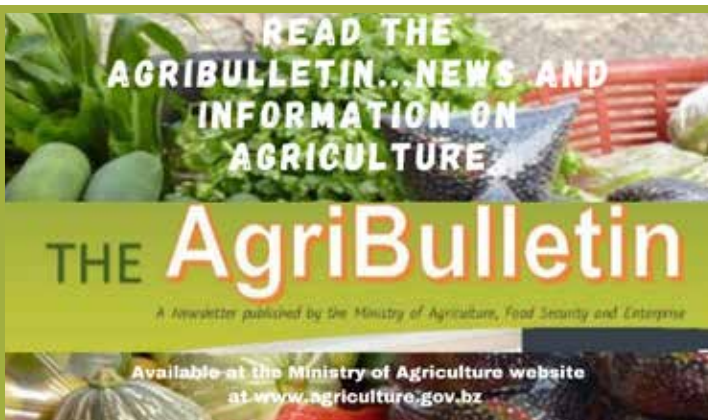
January 2021: [www.hortidaily.com/article/9285646/can-leds-affect-the-taste-and-smell-of-vegetables/](http://www.hortidaily.com/article/9285646/can-leds-affect-the-taste-and-smell-of-vegetables/) Find some very interesting facts on how various types and levels of **LED lighting does indeed affect not only taste and smell of produce**, but also measurable levels of factors such as those which affect: anti-inflammatory benefits, pathogen resistance, and shelf life (via higher fiber and less water in the produce). More information at [www.valoya.com](http://www.valoya.com)

January 2021: It was announced that **shareholders in Germany will sue Bayer in a court in Cologne**. This is due to Bayer's share losses of approximately 45% since Bayer's purchase of Monsanto and the huge damages/losses incurred by court challenges regarding RoundUp.

January 2021: The USRTK.org (U.S. Right to Know) reports that the **Chinese Academy of Agricultural Sciences, Beijing and the Chinese Bureau of Landscape and Forestry, in the online journal Scientific Reports, said they found "a range of negative impacts on honeybees when exposing the bees to RoundUp, a glyphosate-based product sold by Monsanto owner, Bayer AG"**.

**Trends for Land ownership in the U.S.:** As per a 2019 Midwest Center for Investigative Reporting, foreign investors own or control via long term leases, at least 28.3 M ac in the US. States leading in this foreign control are: Maine at 3.1M ac; Texas at 3M ac; Alabama at 1.6M ac; Washington at 1.5M ac and Michigan at 1.3M ac. Food security is the largest concern regarding foreign ownership/control. Forbes magazine announced in January 2021 that Bill Gates is the largest owner of farmland in the US, with 242,000 ac of farmland plus an additional 27,000 ac of non-ag land. In 2019 it was published that Jeff Bezos of Amazon owns 420,000 ac, mainly in Texas. We could not source recent data on US individual farm ownership, but other data implies that the number of smaller and medium sized farms is diminishing as they are purchased and combined into fewer and larger farms, concentrating the industry into fewer decision makers.

December 2020: <https://reuters.com/article/uk-france-glyphosate-idUSKBN28H1SK> Reuters reports that **France will give financial aid to farmers who agree to stop using glyphosate**. Tax credits will be given to farmers who claim/will claim to have stopped use of the pesticide in 2021 or 2022. This replaces the failed pledge made by Macron in 2017 to phase it out by 2020. France's farm ministry



Regeneration Belize (RB) and Pro-Organic Belize will jointly sponsor André Leu for an online presentation on 8<sup>th</sup> May at 3 PM. The topic is **What are other places doing to reduce pesticide use? What can Belize do?** The public is

invited to attend. Zoom link will be provided on both Regeneration Belize's and Pro-Organic Belize's FaceBook pages or email [regenerationbelize@protonmail.com](mailto:regenerationbelize@protonmail.com) André Leu is a founder and director of [www.regenerationinternational.org](http://www.regenerationinternational.org). He visited and spoke in Belize at RB's 2018 Tropical Agriculture Conference. Videos of his talks there are available on Regeneration Belize's YouTube channel.



**Seaweed as food:** The UK food store Waitrose has reported increases of 23% for the year 2020, and a 71% increase from 2018 to 2020, for retail sales of seaweed. It is an excellent source of iodine, carbs, fiber, protein, minerals: Fe, Mg, Cu, Zn, K and Mg, as well as vitamins: B, A, C, E and K.

**Pro-Organic Belize announces its speakers list** for spring-summer 2021. Go to Pro-Organic Belize's FaceBook for sign in details for all of these.

\*10<sup>th</sup> April: The CARDI's Country Rep. Ms. Omaira Avila Rostant will give an overview on how CARDI promotes regenerative farming in Belize.

\* 8<sup>th</sup> May: André Leu, one of the founders of Regeneration International and farmer in Queensland, Australia, will speak on **What are other countries doing to reduce pesticide use? What can Belize do?**

\*5<sup>th</sup> June: The Maya Forest Gardeners will give a panel presentation.



## Local and Regional Fuel Prices

★ Same

All prices Bz\$/Gal	Cayo, Belize	Quintana Roo, Mexico	Peten, Guatemala
REGULAR	↑ \$10.16	↑ \$7.84 - 7.92	↑ \$7.81
PREMIUM	↑ \$10.50	↑ \$8.22 - 8.33	↑ \$8.29
DIESEL	↑ \$10.25	↑ \$8.70 - 8.81	↑ \$6.44

## For Information on the status of the Iguana Creek Bridge

waters rising or falling, out of water, under water, go to [iguanacreekbridge.blogspot.com](http://iguanacreekbridge.blogspot.com)

The Iguana Creek Bridge crosses the Belize River near Black Man Eddy Village, off the George Price (Western) Highway.

Find all the Belize news sites linked from one site, including the Belize Ag Report.

[BelizeNews.com](http://BelizeNews.com)





says that stopping use of glyphosate leads to a 16% profit loss, as they focus more on short term profits than on long-term sustainability. See **Mexico's ban on importations of glyphosate and GMO grains and her immediate cessation of "permits for the release of GM maize seeds,** to protect the country's food security and food sovereignty, its native corn and their traditional cornfields", on pg 25 of this issue.

<https://www.jennifermargulis.net/glyphosate-and-covid-19-connection/> This link to a long Dr. Stephanie Seneff (MIT) interview, done in April 2020 and updated in July 2020, is well worth the read. In it **Dr. Seneff discusses "my hypothesis that the biofuel industry is inadvertently introducing glyphosate into fuels** that power our cars, trucks, buses, airplanes and ships. While it has long been known that exhaust fumes are toxic to the lungs, there has been a transformation in the fuel industry over the past decade that may have led to a critical increase in the toxicity of the fumes. Specifically, aerosolized glyphosate may be causing damage to the lungs that makes catching what should be a mild cold into a serious health crisis."



November 2020: Navdanya International reported the outrage from the global community as the UN's Food and Agriculture Organization (FAO), known for many good works, announced that it would "partner with CropLife International", a group whose members include BASF, Bayer Crop Science, Corteva Agriscience, FMC and Syngenta. Much of these companies' revenues originate from sales of highly hazardous pesticides (HHPs). Over 352 organizations in 63 countries immediately protested in November; the list of opponents to this liaison is still growing. Belize joined the FAO in 1983.



February 2021: <https://www.freshplaza.com/article/9292470/launch-of-herbicide-made-with-biopolymers-extracted-from-citrus-peel/> The National University of San Luis in Argentina is developing a biodegradable herbicide made from biopolymers extracted from citrus peel. The product, named *Ecomanto*, is mixed with water and sprayed on the ground, allowing only the location where the seed is planted to grow and preventing light and photosynthesis on the ground surrounding the plant.

"When elephants fight, mice get trampled."

African Proverb



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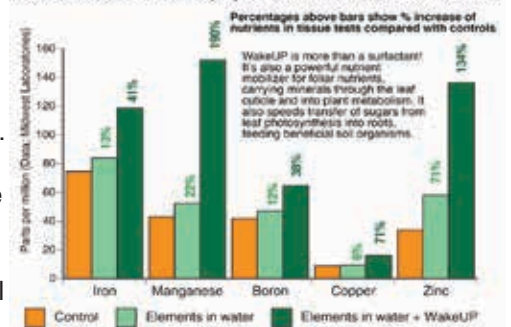
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March 2021: The Belize Ministry of Agriculture, Food Security and Enterprise (MAFSE) and the Belize Agricultural Health Authority (BAHA) reported that **Megalurothrips usitatus**, was detected in Belize.



MAFSE reported that: "Extension officers in the Ministry of Agriculture, Food Security and Enterprise have also been liaising with farmers in order to contain the spread as much as possible and monitor its progress. So far it seems only black-eyed beans are primarily affected, as the variety of **thrips** present seems to have an affinity for that particular legume." This pest, also known as "bean flower thrips" inflicts its damage by primarily feeding on the flowers of the legumes.



March 2021: <https://edition.channel5belize.com/archives/216323> Belize's Channel 5 reported in an interview with Ya'axche Conservation Trust's (YCT) Executive Director Christina Garcia, that they had found "as many as five active hunting camps within the Bladen Nature Reserve" with evidence of illegal logging of rosewood and mahogany. Said Gutierrez, YCT's Protected Areas Program Director, stressed that they need GOB support to protect these valuable reserves. Ms. Garcia added that they need support from the Belize Defense Force (BDF) as well as the Forest Department. These latest incursions are in an area very close to Guatemala.

"Regenerative agriculture is a holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle, and build soil health, crop resilience and nutrient density." Ronnie Cummins



**REGENERATION INTERNATIONAL**

## Big Falls...Continued from page 14

still in use today, 56 years later. Once the road was opened, Big Falls was able to bring in large equipment by road and also had the option to ship rice and freight out by road (rather than solely by river barge). Bus transportation from San Ignacio was also enabled for their expanding workforce, who bunked on the farm during the week.

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*In part 2 (next issue, #45) we will delve more into the expansion of Big Falls' rice growing and processing, with details of the contoured fields, pumping stations, canals, irrigation and drainage systems. Big Falls became one of the biggest agricultural employers in country in the 60's and 70's. Parts 2 and 3 will have more information on their equipment; they even tested new equipment prototypes for Caterpillar.*

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**Photo Details: Page 38**

14. Taking British Honduras Ministry of Agriculture VIPs on a rice harvesting tour of one of the early years, on the John Deere combine.
15. Big Falls' Ag Cat seeding plane with pilot Antonio Raballo.

**Editor's note:** *We thank the Bevis family for sharing their extensive family archives, which, in addition to many photographs, include journal entries, letters and many newspaper and magazine articles. Special recognition goes to Carol Bevis, Chuck's wife who organized much of the records and to the late Betty Bevis who was quite the writer. Jim and Marguerite Bevis and family own and operate Mountain Equestrian Trails (MET) in western Belize.*



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