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Hierba Mora By Santiago Juan



Hierba mora, *Solanum nigrum* (night shade), is a species in the Solanum genus that refers collectively to a wide-ranging group of plants, including poisonous, medicinal, and edible species such as three major crops of global importance: tomato, potato, and eggplant. Hierba mora is not native to Belize but has been in the Americas long enough that it is now naturalized. It is native to Eurasia and was introduced in the Americas, Australasia, and South Africa.

Mora is used in soups, scrambled eggs, and pupusas and chopped up with ground beef. It can be seen occasionally at the market in San Ignacio, and with street vendors. Although not extensively eaten, it is a well-known plant. Most people in rural villages in Belize would easily recognize the plant. It is spread mostly by birds and other small wild life that eat the ripe berries. Often seen in milpas after burning, it is quick to establish itself and tolerates drought and cold weather. It requires very little attention but responds well to organic matter. It does well intercroped with pumkins, corn and beans in the traditional milpa farms. Due to its prolific nature it is one of the first harvested foods from the milpa along with pumpkin flowers and callaloo.

When discussing climate change and food security, we cannot be looking only at western crops which we have traditionally done. We need to revise the traditional attitudes toward weeds and invasive plants; many are weeds and invasive because they have qualities that have made them resilient over thousands of years. Hierba mora is considered an invasive weed in many parts of the Americas. Traditionally it is harvested wild but it is also cultivated in back yards, and by small farmers and gardeners. Bunches are made from the foliage when the plant just begins to flower. The foliage grows back after harvest and thus can be harvested multiple times. This plant produces black/purple berries which are considered to be toxic and are taken off the plant.

The promotion and consumption of indigenous vegetables could help mitigate food insecurity and alleviate malnutrition. The nutritional potential of the leaves and seeds of hierba mora was analyzed, and results indicate protein content as 24.90% and 17.63%, respectively. Other findings are ash 10.18% and 8.05%, crude fibre, 6.81% and 6.29% and carbohydrate, 53.51% and 55.85% for the leaves and seeds, respectively. Mineral analysis revealed the order Mg>K>Ca>Fe>Na>Mn>Zn in the leaves and Mg>K>Fe>Ca>Na>Mn>Zn in the seeds. Phosphorus and sulphur levels were 75.22 and 8.55 mg/100g in the leaves and 62.50 and 14.48, g/100g in the seeds, respectively. Vitamin content indicate the order vitamin C>vitamin B,>folic acid>vitamin E>vitamin A in both the leaves and seeds. Parts of this plant can be toxic to livestock and humans. Nonetheless, ripe berries and cooked leaves of edible strains are used extensively throughout Central America. In India there is renewed interest in this plant as a crop and a number of scientific articles have been published. Most of the research is for its medicinal properties and its ability to inhibit the growth of certain cancer causing cells. All plant parts are used as traditional medicine.

There are no solid statistics on how much African nightshade is currently cultivated. But the crop is one of the most important indigenous leafy vegetables in West and Central Africa, and to a lesser extent East Africa, according to Plant Resources of Tropical Africa (PROTA). Called African nightshade there, it is also gaining popularity near cities for city dwellers who crave a taste of home. The bud, flowers, and fruits are removed, and the leaves and fresh shoots eaten as a cooked vegetable. The vegetable can be very bitter; milk or salt is often added to reduce bitterness. It is sometimes served with fufu, which is made from cassava, plantains, vams, corn or sorghum. The high nutritional value makes African nightshade especially important for poor people, as well as helping people suffering from HIV/AIDS get better nutrition. Leaf extracts from African nightshade are used to treat diarrhea, eye infections, and jaundice. The raw fruit is sometimes chewed to treat stomach ulcers or stomach ache. In fact, nightshades are traditionally used worldwide as medicinal plants, especially to treat stomach ailments.

Other uses for African nightshade include fodder for cattle and goats. Dye can be made from both the leaves and the fruit.

Cameroon produces enough African nightshade to export to neighboring countries. According to Patrick Maundu at Bioversity International, demand for the crop has recently risen significantly since East African supermarkets started stocking it. "When the crop first hit the Uchumi supermarket shelves in Kenya and Uganda, it was just a matter of time before Nakumatt supermarkets and other major chains took it up. In Tanzania, the

Continued on page 11

Mission Statement:

The Belize Ag Report is an independent quarterly 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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To the EDITOR

Dear Editors,

I was completely unprepared for the swift destruction of rainforest and its rapid conversion to mile after mile of what will soon be irrigated sugarcane fields here in the Cayo district. Within a few short weeks the devastation was complete:

GONE! Rainforest... GONE! Animal habitats... GONE! Birds...

and as soon as the giant rolls of plastic tubing can be distributed around the fields, gallons and gallons of water from the Belize River will be GONE!

The sugar industry will add some jobs to the economy of Belize. However, at what cost? Consider the loss to future generations of the biodiversity of Belize, the additional costs in healthcare due to heavy consumption of sugar and sugar sweetened products, and gradual extinction of many of our animal species. These cannot be replaced nor can healthy dietary habits be achieved through sugar consumption.

The University of California San Francisco claims, "Growing scientific evidence shows that eating too much <u>added sugar</u> is linked to serious diseases, such as <u>diabetes</u>, <u>heart disease</u> and <u>liver</u> disease."

How do concerned citizens and residents insist on more sustainable alternatives to the reckless slash and burn techniques used to turn the rainforest into short-term profits for very few recipients? Is the "power of profit" such a colossal titan that our Department of Agriculture can't insist on far-sighted planting practices and policies that will benefit the entire country and surrounding community? Page 10 of an important paper from: *The Economics of Ecosystems and Biodiversity for National and International Policy Makers 2009* states, "Benefits that are felt with a long-term horizon (e.g. from climate regulation) are frequently ignored. This **systematic under-valuation of ecosystem services** and failure to capture the values is one of the main causes underlying today's biodiversity crisis. Values that are not overtly part of a financial equation are too often ignored."

Responsible land management can profit farmers and promote jobs without destroying the environment. Shouldn't sustainability and conservation of flora, fauna, air, and water be an obligatory component of agricultural planning and planting? How do we concerned and affected people promote a positive shift in farming policies to promote environmental health? Who can give our children and grandchildren answers?

Very sincerely yours, Mary P. and Herbert W. Burch Cayo District

The Belize Ag Report, P.O. Box 150, San Ignacio, Cayo District, Belize, Central America Telephone: 663-6777 *(please, no text, no voicemail)* Editors: Beth Roberson and Dottie Feucht Associate: Sally Thackery Publisher: Beth Roberson Printed by BRC Printing, Benque Viejo, Cayo District, Belize **Submissions as follows:** Letters to the Editor, Ads & Articles to: belizeagreport@gmail.com Deadlines for submissions: 1st of the month prior to publication. 4 Issues per year *Original Site Design by Xen Wildman*

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look like in the future with a thriving hemp industry. Fast forward 5 to 10 years...

ibuted Belize Through understanding the differences between industrial hemp and marijuana, Belizeans have learned the merits of a plant that has diverse and valuable uses. In fact, the world has embraced and acknowledged that hemp is one of our greatest agricultural gifts.

To the EDITOR

Dear Editor,

The success of introducing industrial hemp crops to the Belize agricultural landscape was the result of creating a vital and effective collaboration between the private sector and governing agencies working together to build economic and environmental benefits countrywide.

After hearing from many who wish to see Belize become greener,

cleaner, healthier and wealthier through the development of

its hemp agro-industry (including cultivation, processing, and

marketing) we have painted a picture to show what Belize might

In the planning stages, experts were summoned to help provide the infrastructure to plant and process hemp as a new sustainable industry. Successful trials were conducted to determine which hemp seeds thrive in the tropics with 2 to 3 potential harvests per year.

Through collaborative efforts, a strong foundation was built to encourage opportunities to invest and develop the production and processing of industrial hemp in Belize.

One of Belize's greatest exports is now industrial hemp and hemp products. These are surpassing exports of citrus, sugar, and bananas. The demand for hemp worldwide is increasing yearly with over 25,000 products being made from hemp -- including food for humans and animals, bio-fuels, building materials, plastic composites, and medicine.

With its first functioning multipurpose industrial hemp processing facility, the country has become a leader in the industrial hemp agro-industries of the Caribbean. This facility also provides training programs for farmers and production workers.

Farmers using industrial hemp as a rotation crop no longer need expensive weed killers. Hemp, throughout farming history, has well served this purpose. Requiring little water compared to other crops, hemp is the most effective phytoremediation plant, cleaning soil contaminated from past agro-chemical over-use and continues to provide nutrients to the soil to support other food crops.

School children whose undernourishment once hindered their abilities to learn and achieve are receiving a highly nutritious morning porridge made with hemp seed and moringa -- a super food for body and brain health.

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Textile artisans are weaving with locally grown hemp making long-lasting clothing, bags, other textiles, and strong traditional baskets.

Carbon-negative hemp is being processed into building materials, providing families with beautiful, low cost, airtight, fire and pest resistant, mold-free, homes and is alleviating the devastation caused by deforestation for wood.

Since the industrial hemp program was established, the lives of Belizean farmers, the population, and wildlife have greatly benefitted. As well, the environment, health and educational levels, standard of living, and the economy have also thrived. Belize has become greener, cleaner, healthier and wealthier, adding millions of dollars each year to the economy since the industrial hemp program began.

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Belize National Citrus Conference By Wilbert Ramclam



The 105 year old citrus industry had its first-ever national citrus conference held on 18 April 2018 at the host Belagro's Belmopan warehouse of the Big Creek Group of Companies. Belagro's Manager Wilbert Ramclam moderated the very successful event. The forum was attended by 100 or so participants, that included citrus growers, GOB officials, representatives of the processing company, and other stakeholders.

A presentation was delivered by Dr. Hamed Doostdar of Keyplex Limited. Dr. Doostdar is well respected for his expertise in plant nutrition and the development of agricultural products used in the citrus industry in Florida and worldwide. He shared the successes and challenges faced by citrus growers in Florida and other citrus growing regions in the world. He stressed the importance of selecting good root stock and planting seedlings with plenty of room for the tap root to grow straight down, instead of J shaped; he added that this planting method also allows the secondary and feeder roots to properly form and grow, which is critical for productivity and the increased lifespan of the plant. Dr. Doostdar stated that in Belize it would be advisable for growers to dig through the hard pack when planting to allow the tap root to penetrate deep enough to be able to maximize water and nutrient absorption.

Dr. Doostdar highlighted the root stocks and grafts that should be selected for different growing conditions and fruit characteristics. He also emphasized the fact that regardless of the variety chosen, all citrus plants need to develop a healthy root system and have proper drainage to achieve optimal production results. To solidify his point on drainage, Dr. Dootstdar stated that a citrus plant will die if its roots are submerged in standing water for as little as three days. He also identified critical nutrients required by each variety of citrus and best practices in pest management for citrus groves. Dr. Doostdar declared that there has been a tremendous amount of research conducted on the HLB disease over the years. This scientific work has resulted in the development and implementation of effective treatment protocols, such as those that incorporate antibiotics and nutrients such as iron, which have proven to be increasingly successful in the fields. (The Japanese presented a paper at a citrus conference announcing their success in curing the disease with iron.)

Continued on pg 6

Belize National Citrus...Continued from page 5

Industry statistics reveal that there are over 30,000 acres of citrus groves in Belize, producing two crops per year. The crops for oranges are harvested in the months of December through June; grapefruits are harvested October through March. The latest production figures were presented by Chief Agriculture Officer (CAO) Andrew Harrison.

| DISTRICT | BOXES PRODUCED |
|-------------|----------------|
| Stann Creek | 1,800,000 |
| Сауо | 1,100,000 |
| Belize | 451,000 |
| Toledo | 150,000 |
| TOTAL | 3,501,000 |

While there has been a marked decrease in production since the onset of the HLB disease, there are 2 positive developments in the industry: (1) a substantial number of the trees that were impacted by the HLB disease have been replaced and (2) new acreage. These new groves are being planted with a density of 165 orange trees and 116 grapefruit trees per acre. The demand for citrus products is still greater than the supply, which translates into improved prices for the juices and other by-products, and a tremendous upside for citrus growers to capitalize on by increasing their fruit production.

An overview of the processing plant was given by Mr. Nikita Usher of Citrus Products of Belize, Ltd. (CPBL). He highlighted the challenges faced by CPBL with the frequent changes in import and product certifications and requirements by countries importing Belizean citrus, and the additional expenses related to these issues. Mr. Usher stated that 42% of the citrus products is exported to CARICOM, 27% is shipped to the U.S., 19% is dispatched to the EU, while 10% of production is consumed in the domestic market. He explained that a mere 2% of citrus products is exported to Japan because of their 25% tariff on citrus imports. An interesting point made by Mr. Usher is that although a vast majority of CPBL's products are juices in various forms, 21% of the company's revenue is now generated by the sale of animal feed made from citrus peels, and 12% comes from citrus oils that are used in many different products. (The product called Citrus Power is one of the most effective sprays for killing termites!)

Mr. Usher added that Belize is known worldwide for its quality citrus products; this is attributable to the fact that the fruits are processed within twenty four hours after being delivered to the plant yard. He explained that fruit quality is tested by checking the pound solids/sugar content or BRIX, and the price paid to the grower depends on the results of that test; the higher the BRIX, the higher the price. He underscored the point that fruit does not ripen after it is picked; therefore, growers must ensure that fruits are harvested and processed at the peak of their maturity to guarantee top quality. Fruit that is not picked at its peak falls from the tree and deteriorates, resulting in great loss to the grower.

The decline in citrus production in Belize was the focus of discussion led by Dr. Henry Canton. He said he has lived through 4 such declines: 1984, 1995, 1999 and 2002. He noted that the latest decline in production came after CPBL expanded their processing capacity to 10 million boxes annually; this means that the processing plants are currently operating at only 30% of

their maximum capacity. He urged the growers to band together, share information, meet the challenges, and find solutions in a unified effort.

Engineer Fermin Blanco, from the International Regional Organization for Plant and Animal Health (OIRSA), announced that farmers can now access a GOB web site to obtain the weather forecast for the next day, the near future and predictions for the season. The data collected for studying the effects of climate change was developed from models of past data and updates of current satellite data.

The management and staff of Belagro Limited would like to thank all the stakeholders who attended the forum. We plan to build on the strengths of this year's event, and have an even more impactful forum next year. Based on the interventions made by the participants during the forum, it is clear that there is an urgent need for the industry to develop a strategic plan that will serve as a roadmap to move forward from the current challenged state it is in, to a state of growth and prosperity. Of course, this will require the active participation of all growers, the processor, financial institutions, and the government entities. Belagro's managing director, Zaid Flores, has committed the company to be a strategic partner in the industry's recovery. This commitment comes in the form of providing customized products to meet the needs of the growers, creating the enabling environment for information sharing, and tapping into Belagro's vast international network to make top class technical assistance available to all growers. This commitment is not based solely on the fact that Belagro is a supplier of agricultural inputs; instead it is rooted in the reality that the directors of this company are heavily invested as citrus growers. The success of this industry is our success.



Coconut Water Standards By Dottie Feucht



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In issue 38 of the Belize Ag Report we included a report on the CARICOM regional standards for coconut oil. This is a summary of the standards for natural coconut water which is defined as *undiluted*, *natural*, *untreated clear liquid endosperm of the coconut without additives*. If you buy commercially

prepared coconut water labeled *Packaged Natural Coconut Water* according to these standards you can be sure that the coconuts used were harvested seven to nine months after pollination; that no fallen coconuts were used; that the composition in terms of sugars, acids, fats and ash are within specified range; that the quality in terms of physiochemical and microbiological limits is met; that it is free of contaminants such as extraneous matter or pesticide residue and that the packaging was done soon after harvest to prevent the possibility of contamination, deterioration or the development of pathogenic and spoilage micro-organisms.

The CARICOM Regional Standard, prepared through the CARICOM Regional Organization for Standards and Quality (CROSQ), outlines the specifications for packaged natural coconut water offered for sale in CARICOM member states so as to streamline the industry and clearly differentiate the product of undiluted natural coconut water. It was approved by the Council for Trade and Economic Development in March 2010.

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The coconut water standards are supplemented with detailed recommendations for the hygienic preparation of packaged natural coconut water including harvesting, processing, facilities, equipment, packaging, storing, waste disposal, transporting, distributing, and record keeping for quality control. That document, also prepared by CROSQ, is called the" CARICOM Regional Code of Practice for Packaged Natural Coconut Water".



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BEYOND THE BACKYARD The Humblest of Roots By Jenny Wildman



I have eaten many a root vegetable in soup, stews, boil up, mashed, fried and every which way, some more flavorful than others. In this category I would include beets, carrots, parsnips,

salsify, potatoes, yams, turnips, swedes, manglewurzels, taro, cassava and coco yams. Although we may include bulbs, corms, rhizomes and root stems, the true definition of a root vegetable is a taproot or tuberous root. Most of these are considered by many to be the staple foods of the poor not fit for much else than livestock. The humblest of these is the turnip. They grow all over the world but having never seen any in Belize, I was pleasantly surprised to find some pretty pink and white turnips in my first Consumer-supported Agriculture (CSA) organic veggie box. We are now having people from other places settle here bringing with them their taste for the foods back home, such as celery, kohlrabi, collard greens, daikon, cereliac et al but not once did I hear of anyone craving a turnip.

In parts of Europe the terminology can differ; the swedish turnip or rutabaga is referred to as "turnip" although it is quite different.



It is a cross between the turnip Brassica rapa and wild cabbage and believe it or not cabbages, broccoli, cauliflower and turnips belong to the same Brassica family. Europeans do enjoy the orange flesh of the swede and also use the large orange round root to carve lanterns for fall festivals and to ward off evil spirits.

The white turnip Brassica rapa has a long history becoming an established crop in Roman and Hellenistic times where it was grown for oil as with rapeseed (Canola) another family member.

Pliny the Elder praised the hardy turnip for its utility, its ability to sustain the masses and prevent famines. Every part is edible from the roots to the leaves. Young "baby" turnips can be eaten raw, with no peeling required. Their flavour is milder than the larger woodier varieties. The greens are similar to mustard greens and can be eaten raw or stewed with pork. Certain varieties are grown exclusively for their greens. Old time recipes include pickles and pies. In the Middle East and Japan turnips are pickled and in Germany used in sauerkraut. The turnip was once a prized crop until the 18th century when the potato took its place as a commodity and soon the lowly turnip was pushed into oblivion. It was successfully used as a rotation crop to recover the soil and the tubers were fed to the animals.

The turnip is primarily a biennial vegetable grown in cool climates but my supplier here says it is easy to grow. His main problem is getting folks to buy it. First question is "What is that?" followed by "What do you do with it?" My last recollection of turnips were school lunches where everything was cooked to death so I was likewise not eager to purchase until more experimentation was made.

Being reintroduced I am so excited about the taste and versatility that I find potatoes pale by comparison. Plus the turnip is good for most common ailments, anti-inflammatory and particularly good for asthma sufferers. It lowers blood pressure, aids digestion, cleans teeth; oiled roots are a remedy for coughs and colds. The turnip is low in calories, good for weight loss, high in antioxidants, rich in Vitamin K and C, has calcium vital for bones, potassium and other minerals including sulphur glycosides recognized as anti-cancer agents. One cup of mashed turnip = 5 grams of fiber. If you have sore or damaged feet, boil up some turnips along with the greens; make a poultice with the solids and soak in the liquid for smooth and healthy feet. With all this goodness it must also be anti-aging.

If you are still wondering how to use a turnip the answer is just about any way you would use a potato.

Where you find them is another story. Mine are from a Mennonite community.

Please share your turnip tales, recipes and growing advice. *jenniferjanewildman@gmail.com*





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Caribbean Food Crops Society

FRVING THE CARIBBE AN SINCE The Caribbean Food **Crops Society To Meet in Belize**

The Caribbean Food Crops Society (CFCS) will celebrate its 54th Annual Meeting from July 8 to 13, 2018 at the Ramada Princess Hotel and Casino in Belize City. The theme of this year's meeting is "Multi-functionality of Agriculture in the Caribbean Basin in Countries with Predominant Tourist Industries". Hosting the annual meeting of CFCS in Belize was brought about by a January 2018 meeting between Dr. Wilfredo Colon, Chair and CEO of the CFCS and the Honorable Godwin Hulse and his staff of the Ministry of Agriculture, Forestry, Fisheries, the Environment, Sustainable Development and Immigration. The weeklong annual meeting will consist of keynote speeches, scientific presentations, technical sessions, farmers' forums, field trips, and social and cultural activities.

The CFCS is an independent professional organization of interdisciplinary orientation and membership and not affiliated with any public or private institution. Since its founding in 1963, the CFCS has celebrated its annual meetings in 18 different islands and states in the Greater Caribbean Basin, including Jamaica, Suriname, Guvana, Venezuela, Trinidad & Tobago, Barbados, St. Lucia, Martinique, Dominica, Guadeloupe, St Kitts & Nevis, Antigua, United States Virgin Islands, Puerto Rico, Dominican Republic, Costa Rica, Honduras, Mexico, and the United States.

The objectives of the society are to (1) advance and foster Caribbean food production, processing and distribution and (2) help improve the quality of life of the people of the Greater Caribbean Basin. Originally, it was limited to food crops, but over the past 30 years its mission has broadened to include industrial and feed crops, all aspects of animal sciences, natural resources, and climate change. With 300 members who represent 23 islands and states in the Greater Caribbean Basin, CFCS brings together scholars, researchers, extensionists, farmers, professors, and other professionals associated with agriculture. It is one of the few regional professional organizations that has consistently been able to involve members from all the four main language groups of the Caribbean region (English, Spanish, French and Dutch).

The CFCS members represent a wide range of agricultural national and international organizations, agencies, and institutions of the Caribbean region including:

International and Regional Organizations

- Food and Agriculture Organization (FAO) Subregional Office for the Caribbean
- Inter-American Institute for Cooperation in Agriculture (IICA).
- Caribbean Agricultural Research & Development Institute (CARDI)
- United States Department of Agriculture (USDA)
- University of the West Indies, Jamaica, Barbados, Trinidad and Tobago
- Caribbean Agro-Economic Society
- Caribbean Council of Higher Education in Agriculture (CACHE)

National Organizations and Ministries

Antigua, Ministry of Agriculture

http://cfcs.eea.uprm.edu/

Aruba, Department of Agriculture Barbados, Ministry of Agriculture

- Barbados, Samuel Jackman Prescod Polytechnic
- Belize, University of Belize
- Cayman Islands, Department of Agriculture
- Grenada, Ministry of Agriculture
- Guyana, University of Guyana
- Jamaica, Ministry of Agriculture
- Jamaica, Rural Agricultural Development Authority
- St. Lucia, Ministry of Agriculture
- St. Kitts and Nevis, Ministry of Agriculture
- Suriname. University of Suriname
- Suriname, Ministry of Agriculture

Dominican Republic

- Instituto Dominicano de Investigación Agropecuaria y Forestal (IDIAF)
- Centro para el Desarrollo Agropecuario y Forestal (CEDAF)
- Ministry of Agriculture
- Instituto Superior de Agricultura (ISA)
- Consejo Nacional de Investigciones Agricolas y Forestales (CONIAF)

Puerto Rico

- University of Puerto Rico
- Puerto Rico Department of Agriculture
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 - Sociedad Mexicana de Administración Agropecuaria (SOMEXAA)

Jackfruit By Marquita Stanko



With fruits weighing from 10 pounds to over 70 pounds growing from its trunk and lower branches, this tree begs for a second look and in more ways than one! Not only is the jackfruit an amazing fruit to behold, it's also a highly versatile, resilient and nutritious

tree crop that is suitable for growing in many areas of Belize. Jackfruit is known scientifically as *Artocarpus heterophyllus*. There are many common names like jakfruit, jak, jaca, chakka, nangka, langka, khanun, khnor, mak mi and jaqueira to name quite a few. It is in the *Moraceae* family along with breadfruit (*Artocarpus altilis*), champedak (*Artocarpus integer*), mulberry (*Morus sp.*), and fig (*Ficus sp.*). Native to India, Malaysia and other lowland tropical forests of Southeast Asia, the fruit has been carried and distributed throughout the tropics. It is popular in Jamaica where it has been commonly grown for hundreds of years. So important to Bangladesh that it is the national fruit. It is also the state fruit of Kerala and Tamil Nadu in India where the fruit is highly valued and has been an essential staple for thousands of years.

The jackfruit tree is a multi-functional tree for the home garden or commercial orchard. Once established it requires very little care or outside inputs. Although drought resistant, it does benefit from mulching for moisture retention, especially important during dry season. It can be easily pruned to fit your growing space and makes a good wind barrier. Jackfruit is excellent for intercropping in mixed fruit orchards and cocoa plantations because of its upright columnar growth structure and ability to fruit in varying levels of sunlight exposure. Jackfruit is also a valuable lumber product that is used for furniture and instrument making. The fruit has few pests and diseases but if left ripe on the tree, is vulnerable to birds and other animals like coatimundi. Overripe or imperfect fruit can be fed to livestock and is devoured by pigs. The fruit is best picked when it begins to change color towards yellow and the pointed sections begin to spread out. You can thump the fruit to listen for a deep, hollow sound. Once you determine the fruit is full it can be cut from the tree and stored in shade while it ripens. In 3 to 9 days, the fruit softens and begins to emit a strong aroma. This is when you know it is ready to eat. But first you have to clean it!

Cleaning a jackfruit can be quite challenging until you get the hang of it. Both the ripe and the green jackfruit emit a very sticky latex substance. Coating your table, knife and hands with coconut oil before you begin allows for a much easier cleanup.



There is more than one way to process the ripe fruit, but it's best to cut it in half, then quarter each half. Next, carve the sticky inner core completely away from each quarter piece. At this point it is easy to twist each quarter, making the individual fruit pieces, or arils, easy to remove. Once you pull the large aril from the smaller undeveloped pieces or "rag" remove the seeds and attachments. You can boil the seeds (25 - 30 minutes, until they are soft; then peel them) or roast the large seeds but be sure to save some for planting! Depending on your experience and if you have extra hands helping you, the cleaning process can take over an hour.

To clean the green jackfruit select an unripe fruit around 8-10 pounds. Chop the unripe jackfruit into pieces then remove the outer skin or remove this after boiling. The same applies to the core. Place the chopped pieces into a large pot and boil them for 35-45 minutes until they are soft. To shorten cooking time a pressure cooker can be used. If time permits, boiling over a fire hearth adds a nice flavor. Strain the hot vegetable; when cooled clean any remaining seed coats or peel. This pre-boiled product can be frozen or used immediately. We enjoy it most when it is sautéed in oil and spices until it becomes crumbly and slightly crisp. It is excellent in tacos, salbutes, stir-fry and curries. Preparation time for pre-boiled jackfruit is around 1 1/2 hours, not including cooling time.



You might wonder if it is worth the time that it takes to process a jackfruit for eating. Only if you like fruit that is flavored with hints of pineapple, mango, banana and soursop to varying degrees. Also on average, a fresh jackfruit

yields around 10 pounds of processed fruit for every 30 pound fruit. For the unripe jackfruit, a 10 pound fruit can yield around 5-6 pounds after pre-boiling. Considering the ease of growing a jackfruit tree and the amount of food it produces, it is well worth planting this highly valuable food. It is so versatile it can be eaten out of hand, frozen, made into various sweet dishes, freeze dried, cooked as a vegetable and even made into flour. The seeds can be boiled, roasted, made into a hummus or used in many various recipes. Jackfruit is an excellent source of fiber, carbohydrates, protein, vitamin B6, vitamin C and potassium and should be considered an important source of food for tropical countries.

Before planting jackfruit trees, you might want to consider whether to plant seedlings or grafted trees. The great thing about seedlings is the uniqueness of each tree's fruit. Some can be crunchy while others are soft with fruit ranging in color from light yellow to reddish orange. Jackfruit is very easy to grow from seed and good tasting fruit will generally bear good offspring and you just might grow a new favorite variety. While such variety is ideal it can provide some challenges that could be prevented by using grafted trees of known varieties. Grafted varieties are commonly used in commercial production and selected for qualities such as fruit size, flavor and texture. Since large fruit size can be a barrier in the marketplace, trees bearing smaller fruits have been developed and are now available. Grouping grafted varieties might be a helpful layout for harvesting purposes. Choosing the right plant really depends on what is important to you and what is available. If growing from seed, be sure your seeds are fresh and keep them moist as they are recalcitrant and do not last too long outside of the fruit. If planting a tree, it should be about 15" to 24" tall. Be sure that it is not root bound as maintaining a straight taproot is important for this tree. You should allow for a 20-25 foot growing space for a jackfruit tree. We encourage everyone to try growing a jackfruit tree if you like it and have the space. Growing and processing your own jackfruit is a great way to prevent the need for packaging and transport which, in turn, can save energy.



With good reason, jackfruit is becoming more and more popular as people learn about this valuable food source. It is even becoming readily available, both fresh and green, in markets throughout temperate climates as far as Alaska. Jackfruit is a meal enhancer and can be used in meat or non-meat dishes alike. Jackfruit stands on its own as a main dish, a side dish or bulk to any recipe as it easily blends and takes on the flavors that surround it. Fortunately,

jackfruit can grow productively in Belize in many yards, farms, parks or school yards. It is one of many crops to consider planting for its resilient nature, versatility and large yield. When it comes to food security in the tropics this is not a tree to be ignored. Plant a few jackfruit seeds today and you can have fruit of your very own in just 3 to 5 years. Share your seeds and before too long everyone will have a JACKFRUIT TREE!

Editor's note: Marquita Stanko is an agro-forestry reserve manager in Belize. Over 100 acres of the reserve is dedicated to growing tree crops and bamboo. The major trees are jackfruit and also breadfruit varieties new to Belize which are planted alongside bamboo, coconuts, caimito, sapodillas, mangos and many other tropical fruit trees. Marquita is coming into her 3rd jackfruit season here in Belize and is grateful for the opportunity to contribute to the local food market.

Photos by Marquita Stanko & Sally Thackery

Hierba Mora...Continued from page 3

crop is widely sold in the vegetable markets. As a result, farmers in urban areas have also increased production to keep up with local demand," says Maundu.

In September of 2010, Kenyan Professor Mary Onyango-Abukutsa, who is quoted in *State of the World 2011: Innovations that Nourish the Planet,* was awarded a US\$147,000 grant by Kenya's National Council for Science and Technology to lead research on African indigenous vegetables at Jomo Kenyatta University of Agriculture and Technology. Her research focused on three key vegetables: African nightshade, spider plant, and amaranth.

It is obvious that much effort is being placed on naturalized and native crops world wide. Hierba mora is a crop which we readily have in Belize; local research needs to be done on its potential as human food and animal fodder. We do not have any data on the possible different species that grow in Belize and the potential yields under different cultural practices.

There is continued talk about the potential of genetically modified crops in solving nutritional needs and challenges posed by adverse weather to farmers and ultimately consumers. We have a plant that might be able to contribute to our local and global challenges by simply harnessing what nature has already done for us through thousands of years of selection. Let us all start to look at what we can produce locally and less foreign inputs. We only need to look around our stores stocked with mostly imported goods to realize how little food security we have. Indeed, we have many unnoticed humble plants that can help us achieve independence from financial institutions and gain food security. Hierba mora is a leading one.



Our Vanishing Wetlands By Ed Boles, Aquatic Ecologist



Roughly half of the world's wetlands are lost, mostly occurring within the past 150 years. Making up only 1.5% of the Earth's surface, wetlands provide about 40% of global ecosystem services. Recent Google Earth© images and drone flights over the Belize River valley reveal very high wetland losses from agriculture, mostly occurring within the past 30 years. We are losing wetlands so rapidly around the world and in Belize because most people do not know what wetlands are, considering them wastelands rather than valuable ecosystems critical to our survival. Wetlands are areas of the landscape that are seasonally and sometimes permanently covered in shallow water, saturating the soil, and providing habitat for plants and animals adapted to changing



wet and dry conditions. Examples are shallow margins of lakes with water levels that recede in the dry season. Often swamps (woody plant-dominated wetlands) and marshes (herbaceous plant-dominated wetlands) surround lagoons; and over many thousands of years lagoons may slowly fill in with sediment and organic debris, becoming wetlands.

The Crooked Tree Wildlife Sanctuary protects the largest wetland in Belize, on the lower end of the Belize River Watershed. This very important wetland may be associated with several fault lines or cracks in the bedrock running roughly NNE and SSW. Some wetlands are very small, such as rock-seep wetlands in the Mountain Pine Ridge. These tiny wetlands, created as water slowly seeps out of cracks in granite rock, keep the area and its special assemblage of wetland plants saturated throughout most of the year. During the dry season the algae, seeds, and tiny creatures may dry up into a thin, brittle crust. Tourists tromp through these wetland patches without realizing their significance. Many wetlands in the Belize River Valley are created by oxbow lakes and abandoned channels, formed when the river changes course, leaving behind pieces of river channel that become isolated from flowing water. As seen on Google Earth©, most oxbow lakes are C-shaped, formed when the river cuts through a narrow neck of a river bend, often during a single flood event, by-passing the meander that over many decades may become plugged by sediment and form into a wetland. In other areas water pools in low areas of the landscape, remaining wet long enough during the average year to support wetland plants. Careful examination of fields along the Belize River reveal many impressions of wet soil lacking crop growth, sites where wetland once occurred before being plowed up and sometimes filled.

Why are wetlands so important? Here is a list of the environmental services they provide.



- Accumulate sediment, nutrients, and seeds washed in from upslope areas and from floods
- Purify water, in part, by allowing sediments to settle out of suspension
- Encourage growth of wetland plants through available water and nutrients, providing habitat for microbes, invertebrates, fishes, and birds
- Reduce energy of floodwaters moving over the landscape, reducing flood damage
- Retain and slowly release floodwaters, reducing the magnitude of floods downstream
- Stabilize sediments and soils with wetland plant roots and canopy, reducing erosion
- Hold water on the landscape longer, giving water more time to infiltrate into and recharge groundwater
- Provide closely associated oxygenated waters and nonoxygenated or anoxic waters, helping process nitrogen that becomes available to plants
- Convert nitrates to nitrogen gas in anaerobic sediments, which is vented to the atmosphere, denitrifies our drinking water and keeps nutrients from reaching toxic concentrations
- Promote accumulation of peat or organic material in anoxic sediment, burning carbon that is taken out of circulation in the atmosphere, encouraging global cooling
- Sustain abundant numbers of aquatic plants, fishes, birds, and other aquatic life

Continued on pg 13

2018 National Agriculture and Trade Show



Belize's National Agriculture & Trade Show (NATS) officially opened in Belmopan on Friday 27th April, 2018 under the theme "Let's Get Growing".

The Governor General, Sir Colville N. Young, inspected the BDF Guard of Honor, followed by the welcoming address by The Mayor of Belmopan, Mr. Khalid

Belisle. Guest speaker Mrs. Sandra Bedran, Managing Director of the Atlantic Bank Ltd., spoke about the many opportunities in agriculture, including many servicing our tourism industry.

Keynote speaker Honourable Godwin Hulse. Minister of Agriculture, Fisheries, Forestry, The Environment, Sustainable Development and Immigration, discussed the improvements in the show, including many infrastructure improvements of buildings and gardens, creating a more functional venue not only for the NATS



but for other events throughout the year. He announced that the Belmopan market will soon move its Friday market to the NATS grounds.



Wetlands...Continued from pg 12

• Provide nursery grounds for many aquatic invertebrates and fishes.

Without the ecological services wetlands provide, our standard of living will be greatly affected as food and drinking water availability become reduced. If we continue to eliminate our wetlands in Belize, we will be preventing the next generation of farmers from being able to feed the people. Get to know and understand your wetlands and why they are important. Together we can restore them to the landscape and help secure farming for the future. Farmers of the Year were presented their awards: Mr. Baltazar Campos of Carmelita Village, Orange Walk District for Male Farmer of the Year; Ms. Lorena Peralta of La Gracia Village, Cayo District for Female Farmer of the Year and Mr. Freddy Orellana of Bomba Village, Belize District for Junior Farmer of the Year.

Mr. Gary Ramirez, chair of the NATS Committee gave the vote of thanks.

Attendance was down slightly from last year at 37,461.

However, even with the downpour mid-day Sunday, folks kept coming and enjoyed visiting the 400+ booths (377 from the private sector).

Photos by Sally & Dottie







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Spanish Lookout Commercial and Industrial Expo 2018



Every other year Spanish Lookout hosts its Expo at Countryside Park with an increasing number of attendees, exhibitors and activities. Held this year on March 2nd and 3rd, the Expo drew 17,500 attendees from all over the country, a 10% increase over Expo 2016. The well-organized parking accommodated the

increased number buses of of students, school attendees and exhibitor vehicles. The exhibits, which also increased by 10%, were zoned category by to make it easy for attendees to find





those of most interest. New tents were added to accommodate the new exhibitors. Merchants attracted visitors with special discount coupons. One young fellow who had wanted a guitar for a long time, went each day to collect a 20% discount coupon. He did his

math correctly: "60% off", he told his dad. Although quickly apprised of how discount coupons work, he nevertheless did receive the guitar from an understanding dad.

Although families could choose from a variety of activities including horseback riding, ATV rides,



Continued on pg 34



Technical Consultation on Industrial Hemp Production in Belize By Beth Roberson

On Tuesday, 13th March 2018 Ministry of Agriculture, Fisheries, Forestry, The Environment, Sustainable Development and Immigration (MAFFESDI), the Attorney General's office, Caribbean Agriculture Research & Development Institute (CARDI), Belize Agricultural Health Authority (BAHA), Belize Trade and Investment Development Service (BELTRAIDE) and other GOB concerned parties invited stakeholders to join them in a packed NATS Conference Room for a full day of presentations and discussions about the potential of an industrial hemp industry for Belize.

In spite of the meeting being held on Cabinet day, Minister Hulse nevertheless found time to open the long-awaited consultation with positive remarks about the hemp industry. He compared the media coverage on hemp to that of coconut oil: "The pharmacy industry said it [coconut oil] is not good for you, but that is not true – same is true of cannabis. I go by the practice."

The first presenter for the day was Ms. Karin Westdyk of Cayo District who highlighted the differences between industrial hemp and marijuana. The main differences include: 1. Chemistryindustrial hemp has low THC (tetrahydrocannabinol) and a higher CBD (cannabidoil). THC content: marijuana has approximately 10% or more THC (some medical marijuana can have up to 30% THC) and industrial hemp has 0.0 to 0.5% THC. 2. Appearance - (http:// agreport.bz/2018/03/industrial-hemp-cultivation-in-the-tropics/ or find photos in our printed Issue 39, pg 32 where you will readily see the different look of marijuana and industrial hemp crops in the field.) Hemp grows tightly with 30-40 plants per sq. ft. and up to 15 ft. high. Marijuana needs sun and space. 3. There are approximately 25,000 uses for industrial hemp. 4. Hemp cleans soil. Following the Cherynobyl nuclear disaster, hemp was planted in that area as part of the environmental clean up efforts. Lands can be restored from chemical contamination also when hemp is planted in rotation.



Karin continued outlining industrial hemp's virtues, including its fiber which is very strong. Hemp hurds (see diagram) mixed with lime create an incredible building material. Later in the day, vers of the Australian Industrial

Mr. Charles Kovess of the Australian Industrial Hemp Association (AIHA) also raved about the

utility and incredible marketing opportunities for hemp fiber. He summarized that "there are a number of hemp processors around the world, but there is a great shortage of fiber... World over hemp production is a cottage industry, with less than 300,000 tons grown... whereas the global production of cotton is 29 M tons." Hemp's bast fibers are valued for their length, strength and durability. One large obstacle to processing industrial hemp in the past has been the retting process. Only recently the patenting of an industrial de-corticator (model D8, <u>www.textilecomposite.com.au</u>) has been a gamechanger, eliminating the need for retting. Historically the best canvas materials have been made from hemp; the name 'canvas' derives from *cannabis*. Hemp is a much more environmentally friendly crop than cotton, needing fractionally less pesticides and water (see chart).



A video conference was held with an American marketer, who is keen to provide marketing services to Belize, including branding and developing value-added hemp industries, which could be a huge offset to our foreign exchange. She

further noted that "hemp biodegradable plastic could play a huge role as fossil fuel plastics are a growing nightmare".

Crown Counsel Odwin Trenton of the Attorney General's office made a short presentation followed by a very interactive question and answer session in which he was asking the private sector for inputs. He stated, "Industrial hemp is marijuana's sober cousin", and that of the several US states and 30 countries allowing industrial hemp, the only commonwealth members currently growing are Canada and Australia. Mr. Trenton opined that he believes criteria might be established allowing from 0.0 to 1.5% THC. CARDI agronomist Mr. George Emmanuel stated that "CARICOM has already decided on the 0.3%, so we need to keep that in mind". CARDI country representative Ms. Omaira Avila reminded everyone that Belize will be needing a laboratory for the hemp industry. Defining what financial costs will need to be met from from hemp license revenues and also what criteria (farmer criteria) should be implemented to obtain a hemp cultivation license sparked lively but productive interactive discussions.

Regarding establishing criteria for hemp varieties to be allowed into Belize, Mr. Kovess of AIHA very strongly advised Belize to consider the services of Mr. John Muir (johnsmuir.weebly.com). Muir is an agricultural development agronomist and an industrial hemp consultant. He is currently contracted by the Cambodian government, assisting them with many of the same difficult questions that we in Belize are deliberating; the critical decisions forthcoming from GOB can bless or condemn an industrial hemp industry here.

MAFFESDI's CEO Mr. Jose Alpuche summed up the day's activities, commenting, "[Industrial hemp] is not a moral issue; this is a business issue, and Ministry has to overcome [factors] and take things from a strictly business perspective". All present couldn't have agreed more with the CEO, and are keenly waiting to hear more from GOB in order to proceed with establishing a vibrant industrial hemp industry in Belize.



Albrecht's Soil Fertility Work By Neal Kinsey



Some fifty years ago, when first becoming acquainted with Dr. William Albrecht and his work, and perhaps even far longer than that, it was felt by many in agricultural education (but Dr. Albrecht was not one of them) that those doing the farming were not smart enough to understand the basic "science" of agriculture. If that were ever true, such times are far gone based on what farmers need to know and understand to farm in this day and age. Now there seems to be a much different push to discourage farmers from learning the basics of soil fertility. The claim is that farmers don't have

enough time to learn all the facts for themselves. Teach them in short little "sound bites" and short presentations and articles that leave many facts and interpretations left unsaid. The rest is then supposed to be left up to the needed "experts" who still know best, and not the farmer.

One important question every farmer should ask in regard to obtaining good advice is who is paying for the provided advice he is receiving on which to base his farming operations? Did the farmer pay for it? Or did someone else who may stand to profit greatly from that advice actually pay for what is being advocated? Generally too many of those who are the top producers have tried what is normally provided as advice and for whatever reason it has not always worked well enough for them.

For just over 45 years now the Albrecht system of soil fertility management has been the backbone of our soil fertility work. It is based on the research and basic teaching of Dr. Albrecht. However, most of the articles written about his work generally maintain that it either does not work, is too expensive, is not scientific, or perhaps all three. Furthermore, it has become evident over the years that some researchers opposing Dr. Albrecht's work seemingly cannot admit to being wrong and spend far more time quoting studies done 25 to 30 years ago or longer as the proof for whatever they are on record as claiming to be the case; actually farmers are seeing significant benefits from using his program today, just as much or more than was the case 45 years ago.

The chief goal in agriculture should be to work to educate and labor to train farmers and growers along with all those who strive to help them to know and understand the foundational principles of soil fertility. Provided with basic soil fertility education and using the testing methods now available, farmers can soon learn whether the information being provided is really the actual know-how to help or whether it is just "blowing in the wind." Consequently this gives those who are willing to help provide that solid education the opportunity to work with farmers and ranchers who are most concerned for their land and livestock. These are the farmers who are so concerned that they are willing to devote valuable time and resources to learn the basic principles of soil fertility and crop production. They can better understand the reasons why what they were doing has not worked as intended and the reasons why following the fertility program developed by Dr. Albrecht does work when they follow recommendations that accompany test results.

Some people are critical of the science of Dr. Albrecht's work which consists of eight volumes. However anyone who reads his work for themselves and thinks, let alone those who understand what constitutes scientific research with a Ph.D., would be able to see the truth of it. Still those who are in desperation may resort to "grasping at straws" and accept the authority of others who have never read or considered the research done to validate what Dr. Albrecht advocated out on the farm or even on university research plots.

Working as a professor at University of Missouri, Dr. Albrecht was a soil scientist now shown to have been far ahead of his time. The recent completely independent U.S. Government randomized, replicated research now proves the effectiveness of using the Albrecht soil fertility program. This research, scientifically conducted for five years, has concluded that when correctly understood and applied, the results from use of the Albrecht testing and recommendations are higher yields, higher feed value, higher carbon production and the greatest increase of numerous microbial populations in the soil, in comparison to the normally recommended university fertility program for the same crops. The results of this research are scheduled for publication in the near future.

This work is being conducted by Tim Reinbott and has been reported on at each of the three Worldwide Agriculture Conferences (2015 in New Zealand, 2016 in Australia and 2017 in New Zealand). A five year report summary is to be presented at the 2018 Worldwide Agriculture Conference being held in July in Dr. Albrecht's hometown of Columbia, Missouri, directly on the campus where he worked, the University of Missouri.

For those already perceived as being an authority and currently on record that the Albrecht system does not work, no matter how sound the program or whom it has helped, their mind-set will likely never change, let alone bring their added support to the program. So when the five-year randomized, replicated study, financed entirely by government funds, with no "private interest" donations to be blamed for possibly skewing the conclusions is publicized, even though it has followed all the rules of scientific study, the skeptics will, no doubt, continue to reject the system.

In the end every farmer or grower must make the decisions as to what works on his own land. The best approach is to encourage new clients to first prove the program on a reasonable area for three years to see that it pays on their land using their understanding and expertise and then once they see it, begin to expand as time and resources permit.

True science is repeatable and once those on the program see positive results happen over and over again on whatever they may be trying to grow and they understand why that is the case, then let those of another opinion do as they please. So long as we all hold to the doctrine of "educate for success, not legislate for success" there will be room for the cream of the crop to rise to the top. Dr. Albrecht's goal in all that he did was to help the farmer understand how to do his best. His efforts were not geared to those who stood to make a big profit by trying to get farmers and growers to employ practices that would ultimately take away a considerable part of any added profit or cause more harm than good.

Those who are in agriculture are the people who must learn and work to build up and maintain the soil's health and fertility while earning a sufficient livelihood from the land. And those responsible must choose the program that works best for them or at least the one that seems to provide the most reasonable results. Once a program makes enough sense to work out and be adopted, then farmers can continue to both work with it in the field and study to understand the reasons behind it, and thus strive to follow the proper principles to help it work even better.

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Day 2 – **Finish with information** on those listed for first day, plus considerations for cobalt, molybdenum, chloride, selenium and silicon testing and use. Begin presentation on Nitrogen, Sulfur and Phosphate.

Day 3 - Conclusion of N, S and P presentation, then Potassium and Sodium, followed by Magnesium. **Day 4 – Magnesium then Calcium**, Dealing with

Day 4 – Magnesium then Calcium, Dealing with Soil Compaction, then Soil Sampling – Important Considerations, as time permits.

Specifics with actual examples from soil tests This is the farmers' favorite course!

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| Mature ewes - live | per lb | | S | 2. | 00 | | 75 | Paddy rice per pound (Blue Creek) | S | 0.40 farm p | rice, dried | |
| | | BEL | IZE | CHICKE | z | | | SUGAR | HO | NEY | | |
| Wholesale dressed, | , per lb | (Sp Lkt) | S | 5 | 32 | Large B | irds 2.20 | Sugar cane, ton, estimate ONLY | _ | \$42. | 51 | |
| Wholesale dressed, | , per lb | (BI Crk) | S | 2 | 36 | | | Bagasse, per ton - payment, not estimate | S | \$0.50 (price still | undetermined) | |
| Broilers - live per lb | (Sp Ll | ¢t) | | 1. | 13 | | | Honey, 5 gal (approx 60 lbs) | S | \$210.00 ((| CQHPC) | |
| Broilers - live per lb | (BI Cr | k) | S | 1. | 18 | | | Honey, specialty, 5 gal (approx 60 lbs) | S | \$210.00-250 | .00 (Cayo) | |
| Spent hens per 4 lb | bird (S | Sp Lkt) | S | 5 | 06 | | | SPECIAL F | ARI | M ITEMS | | |
| Spent hens per 4 lb | bird (E | 31 Crk) | S | 3 | 50 | | | Eggs - tray of 30, farm price | S | 4.80 (Sp Lkt) | 5.25 (Blue Creek | 0 |
| | | | CIT | RUS | | | | WD milk/lb farmer base price (varies by fat%) | L/S | approx 0.52 contract | approx 0.49 non-contr | act |
| Oranges per lb sol | lid, est | . final | S | 2.2382 (| \$13.2051 p | er box) | | Raw milk (farmer direct sales) | S | 6.00 per | half gal | |
| Grapefruit per lb so | olid, e: | st. final | S | 3.0620 (| \$11.9419 pt | er box) | | CAG | CAC | 0 | | |
| | | 0 | 000 | NUTS | | | | Cacao beans Organic (MMC) /lb | S | 3.50 dried f | ermented | |
| Green Coconuts, c | del'd tc |) Cayo, bul | ິ ເ | sm | 0.40 med | 0.45 lg (| 0.50 | Cacao beans Organic (MMC) /lb | S | 1.10 wet | beans | |
| Dry Coconuts, del' | 'd to C | ayo, bulk | S | | 0.35 - | .0.40 | | US Cacao beans, metric ton (ICCO) | т | US\$ 2,6 | 302.00 | |
| L*** | These 1 | brices are i | the be | st estimate | s only fron | 1 our best | sources an | d simply provide a range to assist buyers a | s pui | ellers in negotiation | | |

HOMEMADE HEALTH DIATOMACEOUS EARTH Marguerite Fly Bevis, RN, BSN

In a quest to detoxify home and body, I discovered a remedy for fleas and ticks for animals that was non-toxic, and, it turns out, even beneficial for humans: *diatomaceous earth (DE)*; it is basically fossilized aquatic algae that has been compressed over millions of years and now can be found at various mines around the world and in fresh and salt-water. Food-grade DE comes from freshwater deposits. It is the purest kind and is safe for human consumption in small amounts. Like all good things, it must be taken with care and understanding.

Diatomaceous earth is made up of fossilized diatoms: singlecelled algae, tiny plants with a shell made of silicon dioxide, also called silica. There are more than 10,000 species of diatoms. They are found in sunlit water with plenty of nutrients and dissolved silica. They are plentiful in salt water, but are also found in freshwater environments, especially those with volcanic deposits because diatoms require soluble silica which is found in ancient volcanic lakes. When diatoms die, their silica shells accumulate on the bottoms of bodies of water. Over time, they compress into deposits of chalky rock. DE is mined from dried ancient lake-beds. After it is quarried, it is dried and milled into a fine powder, much like flour. There are various grades; one must be sure to look for food grade for internal use.

The benefits of diatomaceous earth may be a surprise to us, but the Chinese have been using it for pest control for 4000 years. Native Americans used it in their grain to repel insects. It has been used in construction by the Greeks who made bricks with it. It is highly absorbent and mildly abrasive and can be found in products from toothpaste, medicines, paint and skin-care to pesticides for animals and plants. It was in 1960 that DE was first used as a pesticide in the United States. There are over 150 registered products containing DE.

Our bodies use silica to store minerals in joints, organs, and other soft tissues, helping to prevent problems due to calcium deficiency, such as osteoporosis, bone spurs, weak hair and brittle nails. DE helps to detoxify your body; its coarse edges gently scrub your digestive system which removes metals and other toxins. DE adds trace minerals to your body: calcium, potassium, sodium, magnesium, iron, copper and zirconium. Regular consumption improves hair, skin, and nails. Other benefits are better digestive health, increased energy, and reduction of cholesterol. DE may help reduce joint and ligament pain. Perhaps most important, using diatomaceous earth can keep your home toxin-free, deterring pests without using poisons.

Using DE as a pesticide: Diatomaceous earth is not poisonous so you may wonder how it can work as a pesticide. DE is very coarse and absorbent; when insects walk over DE, it scratches their waxy exoskeleton and dehydrates them. A flour sifter works well to apply to a large area. For small places, an old ketchup or mustard bottle can be used to shoot DE into cracks and crevices. Do wear eye and breathing protection while applying DE as it is irritating to the eyes and can be harmful to the lungs if inhaled over a long period of time. It is less effective as a pesticide when it is wet; however it can be applied, especially to horizontal places, when it is wet and left to dry. In the home, DE can be used to eliminate pests, spiders, ants, cockroaches. Apply wherever you think insects are living. Sprinkle on carpets and floors, using a broom to spread evenly and deeply. Leave for 4 to 12 hours before vacuuming. Repeat weekly for up to a month. To make a DE "slurry", mix DE in water using about 4 tablespoons to a

gallon of water. Shake frequently. It can be used to help control aphids on plants, ants, cockroaches and even bed bugs. It is actually beneficial to plants and is often used as an additive to soil mixtures.

In the garden deter slugs, ants, spiders, and aphids with DE. Apply wet using slurry mixed in a spray bottle or sprayer. **Caution:** to prevent killing beneficial insects like honeybees, ladybugs, praying mantises, and lacewings, don't apply to blossoms or on foliage where you see bees. Apply early in the morning or late in the evening when bees or less active. If you see bees on plants you have treated, wash off the DE with water.

Using DE on animals: Diatomaceous earth is especially helpful in controlling fleas and ticks on animals. Apply to your pet's coat and to bedding and other areas the pet frequents. You can apply by using a flour sifter or filling a sock with DE and sprinkling puffs of the powder on the animal and bedding area. Adding a small amount to their dry food will help get rid of parasites.

Using DE for health: In humans, DE acts more like an intestinal scrub-brush. Take about one teaspoon of food-grade diatomaceous earth in water once a day on an empty stomach. Drink at least another cup of water afterward and continue to consume plenty of water throughout the day. Over time you can increase the dosage up to maximum one tablespoon daily. Do not use continuously. To safely detoxify, use for ten days, then take a break for ten days. Do this for up to 90 days. Diatomaceous earth is tasteless, a bit chalky. You can mix with water or juice (Cranberry juice works well.) or in a smoothie or yoghurt. Be aware that you may experience symptoms of detoxification as the gut environment changes. As yeast dies off and your body releases toxins, you may experience mild headaches or flu-like symptoms, maybe mild fatigue. These symptoms should diminish within a couple of weeks. Do not be concerned unless the symptoms are severe, in which case please seek medical advice.

Risks and side effects: Food-grade DE is generally recognized as being safe for use externally and internally; however it can be irritating to the eyes and lungs. Wear protective eyewear and something over the nose and mouth to prevent inhalation of the fine powder. In some cases, it may be irritating to the skin. Monitor your symptoms and discontinue use if irritation continues. Keep away from small children and babies who may be more sensitive to its effects.

Continued on page 27



Regeneration International Works with Belizeans to Scale Up **Regenerative Ag**



Early in June 2015, about 60 peoplefarmers, scientists, activists, media, business leaders-representing 21 countries convened in Costa Rica to launch Regeneration International (RI), a new nonprofit organization with a global mission: to promote and facilitate the global transition to regenerative agriculture and land-use practices and

perationInternational.org

systems that provide abundant, nutritious food; revitalize local economies; regenerate soil fertility and water-retention capacity; nurture biodiversity; promote social justice and fair trade; and restore climate stability.

In 2015 the word "regeneration," in the context of food and

farming, was relatively new. So in the early days RI focused heavily on education and movementbuilding-but always with an eye toward igniting an on-the-ground regenerative agriculture revolution.

What is regenerative agriculture? At its most basic level, regenerative agriculture refers to an approach to farming and food production that on ecological is based principles and living

systems, unlike the industrial model which relies heavily on monocultures, factory farms and chemical inputs, such as synthetic fertilizers, pesticides and herbicides. Unlike industrial farming, regenerative farmers leave the land healthier than it was before they began farming it. They achieve this by employing practices_that build organic soil matter, which helps draw down and sequester carbon and improve the soil's water-retention capacity making their farms more climate-resilient.

Building a Regeneration Belize Alliance. During the past 12 months, RI has focused on building local and regional regeneration alliances in key regions of the world. The purpose of these alliances is to bring together farmers, consumers, business leaders, policymakers, indigenous peoples and others to build the collective power and capacity to facilitate the transition to regenerative agriculture on a regional, systems-level scale.

Regeneration Belize will officially kick off with a conference for all Belizean farmers called Transforming Tropical Agriculture to be held November 14-16, in Belmopan. So far, Belize's Ministry of Agriculture has been receptive to the idea of promoting regenerative agriculture in his country, according to Ercilia Sahores, RI's Latin America political director. Sahores, who has been working closely with local groups to organize the November event and launch Regeneration Belize, says Belize is the perfect country for uniting diverse groups around a common purpose. "Belize has one of the most diverse cultures of any country I've visited," Sahores said. "I recently found myself at a Chinese restaurant surrounded by people of Mayan descent who

> were speaking in English, people speaking Indian Creole, Americans, Brits, Mennonites, Garinagu speaking Garifuna and, of course, Chinese. All this in a country of just 367,000 people. And all of them, as Belizeans, share the same concerns and purpose; they understand that they need to do everything in their power to regenerate their country's soil."

Belize is just one of the countries where RI is

working with citizens to introduce and scale up regenerative agriculture and land-use practices and systems. Here's a list of other alliance-building efforts:

South Africa: Zimbabwe-based RI Steering Committee member Precious Phiri works with farmers and business leaders in South Africa with a special emphasis on holistic planned grazing, a

Continued on page 34



REGENERATION INTERNATIONAL & REGENERATION BELIZE Present

Transforming Tropical Agriculture: Conference for All Belizean Farmers

14-15-16 November 2018 in Belmopan. Belize – Free entry to all sessions National Agriculture & Trade Show (NATS) Grounds

Hear from expert farmers on the following topics:

◆Challenges of Tillage & Cover Crops in the Lowland Tropics ◆Building Topsoil ◆Under-utilized Native Crops Seed Saving +Grain Storage +Pasture Management +Microbes - Soil Mates +Edible Landscaping +Beekeeping ♦Medicinal Plant Gardening ♦Regenerative Poultry Management ♦Citrus Production

•Farmer Panels: Q & A Interaction and Practical Exchanges **•**Seed Swap and Planting Material at the Event **English and Spanish Presentations** Local Food Venders

www.regenerationinternational.org/belize-conference-2018 regenerationbelize@gmail.com

FACEBOOK info, RI and local RB Regeneration International & Regeneration Belize

From Cane to Cattle Pastures... Froghoppers Identify New Habitat By Beth Roberson





Sugar cane, Sacharum officinarum, is a member of the Poaceae or grass family; froghoppers, Aeneolamia varia and Aneolaomia albofaceata have been recognized as a notable pest for Belizean cane farmers since the first severe infestation in cane of 2007 (See our website, www.agreport.bz for additional information from SIRDI). Cattle ranchers were advised in the 90's to improve their pastures with monocultures of imported grass varieties which are known for their higher nutrition profile, drought resistance and other positive features. Froghoppers gradually recognized these improved pastures (fellow Poaceae) as very suitable habitat for themselves and expanded their turf. According to

Aenolamia albofaceata

the report made at the March 2017 BLPA AGM, by meteorologist Fermin Blanco, froghoppers are spreading thru Central America; weather services hope to assist farmers through weather-based froghopper outbreak predictions.

Savvy ranchers facing froghopper invasions have turned to use of biological controls such as the fungus *Metarhizium anasopliae*; these are not only more environmentally friendly (to applicators and the environment) but are approximately 80% less expensive than chemical controls (see *SIRDI EU IPDM Project*, link below).

The Belize Ag Report visited Running W's manager, Abdala Bedran, at their Cayo District ranch, far from the froghopper's original cane habit in northern Belize, after learning from him at BLPA's AGM of this new worry for Belizean cattle ranchers. Abdala began seeing froghoppers in his Mombasa (*Panicum maximum*) grass pastures about 3 years ago; he attributes Mombasa's vulnerability to its being a slightly 'hairy' grass. He finds their Brizantha (*Brachiaria brizantha*) pastures to be more resilient.

Since locally produced *Metarhizium* will not be available from SIRDI until July of this year, Running W has relied so far on a Mexican product, which is applied by spray plane. The locally produced biocontrol agent is anticipated to be much more economical; SIRDI has not yet established their prices. Abdala estimates that the cost using the imported product is approximately \$7.25 per acre and the spray plane application works out to about \$17 per acre.*

It is recommended to apply the Metarhizium at the end of the day, as sunlight will kill it; Abdala recommends between 5-6 PM as best. Drizzly weather is optimum. He has used it on foggy mornings but never, he cautions, on any mornings in the dry season. Since this fungus also attacks ticks, you can apply it right over your livestock.

The following is from SIRDI:

It is recommended to store the control agent in a refrigerator at temperatures ranging from 4 - 6 °C. Shelf-life depends on formulation type of the end product. Each dose consists of 3 x

10¹² spores. It is recommended that once you open it use it; do not store it. But if it needs to be stored do so for one day and apply it the following day.

Overnight storage can be done in a regular home refrigerator.

| Formulation | Storage | Size/Dose | Comments |
|-------------|---------|-----------|---|
| | Time | | |
| Powder | 1 year | 75 grams | 1 dose is for 1 Ha (2.47 Acres) |
| Liquid | 1 day | 500 mL | 1 dose is for 1 Ha (2.47 Acres). Also this formulation is mostly for application with airplane. |

* GOB's new GST on agricultural services will increase farmer costs for application.

Editor's Note: Metarhizium anasopliae "can infect [i.e. control] approximately 200 species of insects and arthropods such as termites, ticks and weevils..." source: Sirdi EU IPDM Project article, Belize Ag Report issue 37 of August 2017, <u>http://agreport.bz/2017/08/</u> <u>sirdi-eu-ipdm-project-metarhizium-anisopliaeproduction-to-control-froghopper-in-sugar-cane/</u>. Other information: The Sugar Industry Research and Development Institute (SIRDI); contact them at their offices at Mile 66-1/2 Phillip Goldson Highway, Buena Vista Village, Corozal District; their phone is 677-4734 and their email <u>sirdi.belize@gmail.com</u>.





Belize Livestock Producers' Association Holds 40th Annual AGM

On 24 March the BLPA held its 40th Annual General Meeting at their headquarters with members attending from all 6 districts. After welcoming protocol and remarks, several speakers updated members with exciting happenings within the industry.

In his remarks, Chair Dr. Henry Canton noted that the Belize Livestock Registry (BLR) program has been successful and indicates Belize has over 200 new farmers and that the national herd has increased from 110,000 to 135,000 head since the cattle sweep and the traceability program began. He stressed that the time has come now for all ranchers to "bear our own responsibilities" regarding regulation; if not, others will come in and we will "be on the defensive". He also mentioned talks with the PM regarding the new GST costs imposed on farmers. Dr. Canton noted that regarding discussions of the controversial new categories, it was "the first time when every agroproductive sector, all as one, was lobbying [together] for the drop." He emphasized that we must work together within the sector, acting in collaboration with BAHA and others.



CEO Alpuche had much news which included 2 main points: 1. that the key Agricultural Pilot Census project is needed as there is currently "an estimated under-reporting of about \$200M of socio-economic inputs into the country.... so we are looked at as not being as productive and efficient

as we should be". (He reported proudly that for this census all the programming is being done by a small group of professionals in Corozal – which was not only economical but also, importantly, at the end "we [GOB] will own the data". The information from this should enable GOB to more accurately forecast balances and to aid in planting advice and marketing, which will assist in stabilizing prices.) 2. that this year GOB secured \$8M USD for CLIMATE SMART AGRICULTURE programs which can be used to impact all sectors, including livestock. There were several questions to CEO, including queries about livestock sales to Mexico. Several asked if there is any progress in eliminating or reducing the import tax currently levied

Continued on pg 33



The Other Cowfoot By Deborah Harder

The "cowfoot soup", popular among Belizeans, is not made from this herb, but from the actual feet of cows. The herb is named for its resemblance to a cow's hoof print and is a useful native plant. It grows wild and is found all over Belize. Look around your land for



a plant with large leaves (up to 16 inches by 12 inches or more) that smells like anise and has a white spike at the base of the leaf during its blossom time. All you have to do is let it stand. However, young plants can also be transplanted in desired locations. It is often very prolific.

Nurser

Tea made from the leaves is reminiscent of sassafras and very tasty; pick one large or a few small leaves and boil them for 15 minutes or so and let the tea steep until cool. Sweetened with a bit of honey and chilled makes a refresing iced tea. The tea is also medicinal. To prevent parasites or treat mild parasites like pinworms, make cowfoot tea and let your family drink as much as they want. One leaf per family member per day for a week should do the trick. Or try 3 leaves/person once a week as a preventative. (A shilling-size piece of leaf inserted in the anus overnight also takes care of pinworms if done once or twice, but needless to say, children much prefer the tea.) Of course, they will drink more if it is sweetened. Our little children used to like to dip the young blossoms, which resemble white worms, in honey and eat them, enjoying them for both their flavour and significance, and probably accomplishing the same medicinal end.

Nancy Harper of Dangriga area, cooks a great deal of it as a potherb, and adds it to bread and tortilla dough. Mayan folk place a young, tender cowfoot leaf on a waha/banana leaf, boiled chicken on top, and heat it on the comal. Esther Kal has adapted this dish by placing cowfoot leaves in a frying pan with canned chicken pieces on top, and steaming it until the leaves are done. These large leaves could be used many ways to wrap fish or various meats, as they cook tender and impart a delicious flavour. I tried cutting them in half lengthwise and rolling them up, cigar style, with a mixture of cooked breadnuts, chicilaca meat, and various seasonings, then frying them in butter, turning once. My children thought the cowfoot flavour was a bit strong, so more filling and less leaf would be better. Cowfoot leaves are used in savoury dishes such as caldo, Mayan chicken soup.

Chicken Caldo (Chicken Soup)

This delicious Mayan specialty is served with plenty of corn tortillas and is a complete meal.

- 1 Chicken, cleaned and cut up
- 1 Onion
- 2 Cloves garlic
- Sweet or hot pepper
- Several leaves broadleaf thyme
- 6–12 culantro leaves
- 1" piece recado or 1 tsp. ground annatto
- 1 spring mint
- 1 cow foot leaf

Cover chicken with plenty of water. Add herbs and salt to taste. Cook until meat is tender, while you make the tortillas.The Mayan mother serves her caldo to all her family members, making sure a good piece of meat is in each bowl. When available, large chunks of vegetables like coco, yam, cho-cho, cassava, etc. can be boiled in the caldo. But often it is just meat and broth.

ICDF/TTM - Sponsored Genetic Improvement in Sheep and Goats Project By Dottie Feucht



The cattle and poultry industries in Belize just had boost: sheep. а Genetic The Improvement in Sheep and Goat Project, which began in December, 2015, was to be a 3 year project but due

to problems acquiring purebred Barbados Black Belly and Dorper sheep, the project has been extended to December, 2019. Now having acquired 45 local Dorper from breeder/farmer, Amando Carillo in Orange Walk and 29 Dorper and 16 Barbados Black Belly from the U.S., the breeding program began in earnest in the past month. The inauguration ceremony took place on 15 March 2018 at the site of the project at Central Farm with the background baaing of the 125 sheep that were currently housed there.

While the project team was working out the details and awaiting the arrival of the sheep they were busy overseeing the construction of the 1400 square foot barn built on 2 levels to facilitate cleaning and cooler air flow for the animals. The structure has 44 pens to accommodate up to 500 head of sheep. A pasture was seeded with Aruana, Brizantha and Mombasa grass and a "protein bank", an 8 hectare (20 acre) plot was planted with mulberry and mar alfalfa. The sheep feed in the pasture in the morning, followed by the protein bank and then are brought into the barn for supplemental concentrate of various feed depending on the age of the sheep. Training future sheep farmers and breeders was another task undertaken by the team. Extension officers from the Ministry of Agriculture were trained in the breeding and care of sheep to provide training and assistance in their districts.

The inauguration was attended by Ambassador from ROC (Taiwan) His Excellency Charles Liu, Chief Executive Officer (CEO) Jose Alpuche from the Ministry of Agriculture Fisheries, Forestry



Environment, Sustainable Development and Immigration (MAFFESDI), International Regional Organization for Health in Agriculture (OIRSA), and other representatives from the MAFFESDIA, Belize Agricultural Health Authority (BAHA), Belize Livestock Producers Association (BLPA), Pesticide Control Board (PCB), Caribbean Research and Development Institute (CARDI), Central Farm and, of course, sheep farmers.

Each of the imported sheep came with a certificate of pedigree to form the foundation for genetic improvement and the registry of purebred offspring. The sheep have already been ear-tagged for traceability. The project to be conducted at Central Farm will be augmented throughout the country by two sheep farmers selected from each district to form the nucleus of the sheep breeding program. The offspring of the imported sheep will be bought



Phone: 633-0437 or 602-2407 Email: fbtrailers144@gmail.com Located on Baltimore Drive in Spanish Lookout, Belize



by these farmers (\$600/ram; \$400/ ewe) to breed them in accordance with the strict criteria for pedigree registration.

There is a great interest in raising sheep in Belize; 400 farmers registered for the program. Those selected as the core of the breeding

program were chosen by the technical team of the project using a well-defined "scorecard" included at the end of this article. A contract of agreement obligates MAFFESDI, OIRSA BAHA, BLPA and the farmers to establish and maintain the high standards of breeding and traceability through a registry of purebred sheep. The following farmers were given certificates at the inauguration ceremony.

Cayo: Eduardo Juan

Belize: Juan Herrera and Robert Gongora

Stann Creek: Noman Usher and Beef Master/Sonja Duncker

Toledo: Rogelio Oliva and Charles Garay

Orange Walk: Armando Carillo and Doni Uobina

The technical team is still working on selecting replacement of core farmers from Corozal and one more for Cayo.

Filling in for the minister of agriculture, CEO Alpuche remarked that several attempts to establish a sheep industry in the past did not succeed because they did not take a holistic approach as this current project does. The Taiwan Technical Mission (TTM), funded by the International Cooperation and Development Fund (ICDF), has provided the foundation and impetus for the successful commercial production of sheep. Its comprehensive approach will ensure the quality, consistency, and right price mantra for success. CEO Alpuche pledged the support of the ministry for the efforts by the farmers to develop not only the domestic market but exportation to Mexico and Guatemala.

H.E. Liu pledged continued support from the TTM team.

Mr. Lee Pin-Nan, Manager of the Sheep Project, explained that the technology of genetic improvement includes both natural breeding and artificial insemination with very careful monitoring of animal characteristics and precise scheduling. He said that the project team is working on acquiring more Barbados Black Belly sheep and teacher training: extension officers who will instruct and monitor the farmers in their districts, working with the other signatory agencies to ensure best animal care, breeding, traceability and certification.

The inauguration ceremony included a raffle for live sheep, offspring of those that are not to be registered. CEO Alpuche was the first winner. Rather than developing first-hand experience raising sheep he opted to donate the sheep to the Female Farmer of the Year, Merva Flowers. The other two winners were Juan Herrera from Belize City and Kenroy Pinelo who works at Central Farm.

When you visit the sheep barn at Central Farm you will see not only live sheep but a statue of sheep with a plaque describing the project which was unveiled during the inauguration ceremony.

The Genetic Improvement in Sheep and Goat Project Criteria and Scorecard for Core Farmer Selection

| Score | 1-3 | 4-6 | 7-10 | Subtotal |
|---------------------|-----|-----|------|----------|
| Item | | _ | | |
| 1.Sheep herd size | | | | |
| 2.Land size | | | | |
| 3.Sheep house | | | | |
| 4.Fencing | | | | |
| 5.Water system | | | | |
| 6.Feeding system | | | | |
| 7. Farmer's capital | | | | |
| 8. Sheep type | | | | |
| 9. Management | | | | |
| 10. Record keeping | | | | |
| Total | | | | |

Note:

- 1. Sheep herd size: under 30 herds ranks 1-3, 30-100 herds ranks 4-6, over 100 herds ranks 7-10
- 2. Land size: under 10 acres ranks 1-3, 10-50 acres ranks 4-6, over 50 acres ranks 7-10
- 3. Sheep house: nothing to simple cover ranks 1-3, basic house ranks 4-6, qualified division and well-covered ranks 7-10
- 4. Fencing: no fence ranks 1-3, roughly fence 4-6, fine fence ranks 7-10
- 5. Water System: rain, river water ranks 1-3, private well or close to the river ranks 4-6, pipe system ranks 7-10
- 6. Feeding System: simple pasture ranks 1-3, pasture and protein bank ranks 4-6, pasture, protein bank and commercial feed ranks 7-10.
- 7. Farmer Capital: small ranks 1-3, medium ranks 4-6, large ranks 7-10
- Sheep type: crossbred and inbreed ranks 1-3, crossbred but 50% pure ranks 4-6, Pure breeding stock ranks 7-10
- 9. Management: no vaccination, deworm ranks 1-3, deworm, medium mortality ranks 4-6, vaccination, deworm program and good health status ranks 7-10
- Record keeping: no record 1-3, simple bookkeeping ranks
 4-6, good bookkeeping including breeding, moving, treatment ranks 7-10



A New Export Crop For Belize! Turmeric/Yellow Ginger By Umeeda Switlo



Turmeric (*Curcuma longa*), also known as yellow ginger or golden root, was brought to Belize by Indian indentured servants when they came to southern and northern Belize districts. It is an essential spice used

in many Indian foods. The traditional way of using it in Belize was to grind it with a mortar and pestle, add salt, black pepper, garlic, ginger and culantro and make it into round balls. When cooking a curry, people fried onions, added tomatoes and some of the premade turmeric ball. People would also wash, then boil the freshly harvested turmeric root and dry it in the sun followed by the tedious process of mortaring to make a fine pure turmeric powder.



I came to Belize in 2015 to volunteer with the Department of Youth Services to encourage youth in enterprise. I went to Toledo looking for business ideas for youth and to meet Indians at an Indian diaspora

conference. I was introduced to yellow ginger by a farmer from Mafredi named Fred Williams, who had been growing it for many years. The turmeric was very impressive; it was large, of great colour and grew well amongst other shade crops without any agricultural inputs: no herbicides, pesticides or fertilizer or even watering. Pieces of the rhizome that were left in the ground grew again. One acre can grow up to 10,000 lbs. of turmeric. The sustainability of this crop helps mitigate climate change. What is more exciting is that the Toledo turmeric was tested by Naledo to have 7.6% curcumin! The powder has about 2% curcumin. I don't

know whether it was the variety that the Indians brought to Belize, the great organic Belizean rainforest soil, or simply the hopes of those that came here for a better life that made turmeric so popular and successful as a crop.

Turmeric is very good for your health. It is an antioxidant and antiinflammatory agent. It



works well when a fat and black pepper is added to cooking. There are many recipes on the web for cooking with turmeric; you can see some on our website www.naledo.com/recipes. A few of our favourite recipes are mixing turmeric with hot water and honey to make a great morning cleansing drink. You can also boil milk, add turmeric, honey, cinnamon sticks, cloves and cardamom to create a delicious golden milk, a traditional Indian healing beverage called *haldi ka doodh*. In North America people are adding it to their soups, smoothies, salad dressing, stir fries, curries, cassava, chicken, fish, beef and much more.

I asked my daughter, Nareena, to join me in the business venture after creating a delicious turmeric paste using incredible Belizean ingredients. We found a high quality black pepper growing at the Spice Farm in Toledo to add to our recipe. We began processing

Truly Turmeric in Punta Gorda. We had to recruit and train a young Belizean team which began with Leon Higginio and Belkis Medina who are now managers with the company.



Our next step was to ensure we had enough turmeric growing in Toledo. We set about registering and inspecting over 300 growers. We had such a positive response from growers that we had a hard time keeping up with applications! We have stuck to strict Hazard Analysis Critical Control Points (HACCP)



procedures and have worked with Belize Agricultural Health Authority (BAHA) for our analysis and export processes. It has taken a lot of energy but with the encouragement of the CEO of Agriculture, Mr. Alpuche, we did not give up.

In May 2016, we showcased it in Canada and it was hit! We had retailers and the public excited about the taste and health benefits of our Truly Turmeric. Now 2 years later the company exports to Canada and the Bahamas and will soon be expanding its market to the U.S., Trinidad, Tobago, Dominican Republic, Guyana and many more countries. One of the main reasons customers love our product is that it is a social enterprise. We love working with 8 youth at our small factory and over 350 small growers in Toledo District. We know we are making a positive impact in the community and, better still, not doing environmental damage. Our social enterprise has three bottom lines: profit, community and environment. We measure our success using all three parameters. We believe that these parameters are essential for all Belizean products and companies, not only to be competitive on the market but to make sure we mitigate our increasing global climate change challenges.

I have heard people say that Toledo is the poorest part of the country. We feel very differently. It has great potential in its agricultural products from sorrel, cacao, moringa, cardamom, cassava, pineapples, coconuts and so much more. We think that with the right support Toledo District and Belize can become a world leader in organic, regenerative agriculture practices that bring economic growth, while ensuring the natural beauty of Belize is protected and preserved for ecotourism and future generations of Belizeans.

We enjoy working in Belize and love telling the world about the amazing people and the agriculture here. It seems as though you can grow almost anything; there is so much potential in Belize.

Editor's Note: Umeeda Switlo is a biologist, entrepreneur and community activist.



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Come and see the biggest and most beautiful Spice Farm in Belize. We are located at the foot hills of the Maya Mountains, 45 minutes South of the Placencia Junction and 35 minutes from Punta Gorda. We offer tours everyday 8 AM to 3:30 PM. Guests can ride in our tour-mobile while seeing, smelling and touching spice plants that produce spices used in everyday cooking like black pepper, vanilla, cinnamon, cardamom, nutmeg, allspice and many others. Our restaurant serves Belizean, American and South Indian food using ingredients from our farm. We have a very spacious and beautiful hall ideal for parties and seminars.

Over the years we have grown into a botanical garden containing exotic fruit trees and beautiful water lilies and multicolored lotus.

Golden Stream, Southern Highway, Toledo District 221 km, or approximately 3 hours drive from Belize City (501) 670-1338/6004/4906 • goldenstreamspicefarm@gmail.com www.belizespicefarm.com

Homemade Health...Continued from page 20

Dosage for dogs and cats:

| 0 0 | |
|------------------|---------------|
| Dog Size | DE dosage |
| Small dogs | 1/2 teaspoon |
| Less than 50 lbs | 1 teaspoon |
| 50 to 100 lbs | 1 Tablespoon |
| Over 100 lbs | 2 Tablespoons |
| Cat Size | DE dosage |
| Small cats | 1/2 tsp. |
| 7-13 lb. | 1 tsp. |
| Over 13 lbs. | 1 1/2 tsp. |

It is recommended that you not feed DE to puppies and kittens until they are eating solid food.

Dosage for horses, cattle and other livestock: The recommended dosage is up to two percent of the feed's weight. Do not go beyond this but you can go less. Thoroughly mix into animal feed. You can mix large amounts or mix into single servings. DE can be stored long term in animal feed and helps to keep insects away and prevents mold.

| Feed For Large Animals | DE Dosage |
|------------------------|------------|
| 100 lbs | 2 lbs. |
| 75 lbs | 1 1/5 lbs. |
| 50 lbs | 1 lb. |
| 25 lbs | 1/2 lb. |

Chickens & fowl: Diatomaceous earth can also be used to benefit chickens and other fowl. The dosage for chickens is two percent of the feed's weight. Use the guidelines for large animals. Apply to bedding areas of coop and in laying boxes to prevent mites and lice. Repeat after every coop cleaning.

Household uses: Diatomaceous earth can be used to make homemade deodorant, bath bombs, facial masks, and soaps. It can be added to toothpaste to help remove plaque and tartar from your teeth. Some toothpaste brands already contain DE. The easiest way is to dip the dampened bristles into DE before adding toothpaste, then brush as usual.

Make an all-purpose household cleaner using 1 part food-grade diatomaceous earth, 5 parts water, and a few drops of vinegar, lemon juice, or dish soap. Using a cloth, sponge, or paper towel, or spray bottle, apply the mixture to the surface being cleaned and scrub. Be cautious using on wood or other surfaces that may be scratched by using this abrasive product. For carpets, apply dry DE, work into the carpet with a broom, leave 4 to 12 hours; then vacuum.

As you can see, diatomaceous earth can be used in the home and garden, for pets and livestock to aid in preventing and treating pests. Because it is non-toxic to humans, birds, and animals, DE can contribute to healthier lifestyle and can reduce our dependence on toxic chemicals. There is much more to learn. I encourage you to investigate and experiment, for the sake of your health and the health of your loved ones.

Resources:

diatomaceosearth.com cdc.gov/ticks/avoid/in_the_yard.html minerals.usgs.gov/minerals/pubs/commodity/ diatomite/250497.pdf draxe.com/?s=Diatomaceous+ Write to me with comments or questions at marguerite@pobox.com

Disclaimer: If you are ill, please see a doctor or nurse. This information is not intended to replace medical care.

Carbon Farming By Christopher Nesbitt Maya Mountain Research Farm



Global Problem

Globally we have topped 400 ppm in atmospheric carbon: carbon emitted from fossil fuels, soil carbon released from the production of annual crops and carbon emitted from the burning of agricultural land. In the face of climate change caused by increased carbon content in the environment and associated changes in weather patterns, there are two approaches for addressing these problems. One is climate change mitigation, a set of strategies that can drawdown the carbon content of the atmosphere and place it into the landscape using tree crops, and the other is adaptation to the present climate variability; the latter involves creating physical models resilient to crop failure that can result from the variability in rain fall and temperature.

Carbon Farming...what is it?

The organization Drawdown (<u>www.drawdown.org</u>) identifies some of the practices that small holders in Belize traditionally practiced as being excellent ways to drawdown carbon. In his book, *Carbon Farming*, Eric Toeinsmeier identifies some of these practices as "carbon farming". The use of trees, regenerative agriculture, food forests and tropical staple foods are ways farmers can repair damaged soils while reducing vulnerability to climate variability and obtain significant yields over time.

Damaged Agricultural Land: problem & opportunity

One of the areas that can most benefit from the application of tree crops is damaged land. Damaged lands are lands that have come to the end of their use cycle for any particular application and the capacity and fertility has been diminished. Globally there are 950,000,000 to 1.1 billion acres of damaged agricultural landscapes. This represents both an opportunity to return to production, and a challenge to repair. Annual production of agriculture can be considered "catastrophic" because the replacement of biodiverse habitats with acreage of single species is inherently biologically unstable. Most of the time, these damaged landscapes cannot be returned to their previous land use. In Belize we see this in the form of abandoned citrus groves, old cattle pasture, sugar cane and banana plantations that have been used for too long, and milpa that has not been fallowed sufficiently to regain fertility.

Maya Mountain Research Farm, in San Pedro Columbia, Toledo, was a very degraded citrus and cattle farm in 1988, when I moved here. Over decades we created a multi-strata agroforestry system: food in the form of many species of fruit and staple tree crops, tubers, annual crops, and animals; marketables in the form of fruit, sub canopy crops including cacao, coffee, ginger, turmeric, vanilla, cardamom and coffee; over 100 species of medicinal plants and fodder for animals; fiber and timber species; and fuel wood. Moringa provides food for us, poultry and rabbits. We produce corn, beans and pumpkin in inga alley cropping systems which we pioneered in 2011; in our vega food plain we grow vegetables during the dry season.

Our canopy is host to timber species such as cedar, psalmwood, teak, mayflower, guanacaste, and mahogany; fuel wood trees like bay cedar, inga and many other species; and many food species, including fruit and nuts. The long-term goal was to create (1) a food forest that produces food in a seasonal context, with various parts of the year being abundant in whatever is seasonal, and (2) timber. The ecosystem services this complex assembly of plants providing nutrition, soil moisture retention, repair of damaged soils, flood mitigation, carbon sequestration and habitat creation.

Regenerating Damaged Agricultural Land

Converting land from damaged to healthy agro-ecologies requires thought and work. One of the patterns we have observed and replicated at MMRF is the pattern of succession as seen in "wamil", the plant assembly we often see in Belize in recovering forests. The interaction between the trumpet tree (Cecropia peltata), heliconias, gumbo limbo (Bursera simaruba), balsa (Ochroma pyramidale) and other species in "wamil" in rebuilding soil fertility forms our system design. By mimicking the way ecosystems repair themselves in the wake of a disturbance or catastrophe such as a fire or hurricane, we obtained yields from year one until the food forest started to provide for us. To obtain yields from year one, we used "pioneer species", such as banana, to loosen soil and provide biomass and food; pineapple, lemon grass and vetiver grass planted on contour to retain soil, fight erosion and collect nutrients; papaya, cocoyam and cassava to break up soil and provide food; pigeon pea to fix nitrogen, put carbon into the soil and provide food; and chaya to provide food, mulch and shade. These plants gave us an early return while also improving the long term soil health and creating better conditions for our future food forest.

In our system the longer term crops began to provide a yield by year five. The species from the pioneer phase were still sources of calories at the later stages when the agroforestry system had a canopy. Our subcanopy species such as cacao, coffee, vanilla and cardamom use the shade of the canopy we created. After subcanopy harvests, the agroforestry system started producing long-term crops. Some of the long term tropical staple tree canopy species we grow include anjili (*Artocarpus hirsutus*), jackfruit (*A. heterohyllus*), breadnut (*A. camansi*), ramon *Brossimum allicastrum*), cow tree (*Brossimum utile*), peach palm (*Bactris gaspipaes*), banana, plantains (*Musa spp*), avocado (*Persea Americana*), coconut (*Coco nucifera*) and provision tree (*Pachira aquatica*).

| Species | Common name | Tonne per hectare | Product |
|--------------------------------------|---|---------------------------------------|-----------------------------------|
| Annuals | | | |
| Zea mays | corn | .5-4 | starch |
| Oryza sativa | rice | 4-10 | starch |
| Vigna unguiculata | cowpea | .4-1 | protein |
| Phaseola vulgaris | common bean | .4-5 | protein |
| Glycine (max) | soybean | 2-6.2 | protein |
| Perennials | | | |
| Sacha inchi/ Plukenetia volubilis | Inca peanuts | 4 | oil, protein |
| Artcarpus alitilis | breadfruit | 16 | starch |
| Artrocarus heterophylla | jackfruit | N/A Needs more research | starch, protein, oil, fruit |
| Brossimum alicastrum | ramon, breadnut, Maya nut | 7.5 | starch, oil, fruit |
| Bactris gasipaes | peach palm | 30 | starch, oil, protein |
| Artocaprus camansi | breadnut | 3.9-11 | Oil, protein, starch |
| Cajanus cajan | pigeon pea, gunga pea, chicharro, | 6.8 dry weight | protein |
| Coco nucifera | coconut | 2-4 | oil, protein |
| Persea americana | avocado | 5-32 | oil |
| Ipmoea batatas | sweet potato | .6-6.4 | starch, leafy green |
| Dioscorea bulbifera | air potato | 19 | starch |
| Musa | banana | 6.4-21 | starch and sugar |
| Moringa oleifera | moringa | 50 tonnes leaf 31 tonnes pod | protein |
| Manihot esculenta | cassava | 3.2-29 | tuber |



Maya Mountain Research Farm

San Pedro Columbia, Toledo PO 153 Punta Gorda Town, Toledo BELIZE, Central America

Country code 501-630-4386

www.mmrfbz.org www.facebook.com/MayaMountain-ResearchFarm

Energy Returned on Energy Invested

Staple food trees are grown to produce calories at a favorable energy returned on energy invested ratio in comparison to maize, as seen in the attached table. Rainfed maize production in Belize ranges from .5 tonnes per hectare to 4 tonnes per hectare. Similar numbers apply to other annual crops in comparison to staple tree crops. Staple food trees can outproduce annual crops, and offer an impressive amount of calories in return for the calories to establish and maintain them. Annual crops need to be replanted every year; the plants expend energy to establish their root systems every year. Annual crops require soil fertilization every year to maintain production. A lot of energy is spent fighting succession to try to maintain a static condition of a perpetual annual cropping system. On the other hand, food forests work with succession creating deep rooting systems every year and spend energy on fruition rather than growth because the roots, trunks and branches are already established. Food forests increase in fertility every year, especially if a mixture of tree legumes are applied to the species mix. They also replicate ecosystem functions of primary habitat. However, our yields are not easy to measure in terms of kilograms per hectare because we may have over 70 species of plants useful to us in a hectare.

The arboreal architecture of our farm attracts all the mammals of southern Belize, including jaguar, ocelet, jaguarundi, margay and puma, as well as brocket deer, tapir, agouti, gibnut and white lipped and collared peccary; all of these have used our farm as habitat. We see hundreds of species of birds here, including residents and migratory birds who see the structure of food forest as being desirable for habitat. Between the varied fruiting and flowering cycles, there is always something in season for the animals that pass through.

The end result of the planning and management for succession is a highly productive model that replicates essential ecosystem functions while providing food, fuel, fodder, marketable and medicinal crops. If land owners were to map out landscape-scale ecosystems with neighboring farms and create contiguously managed areas, we would be (1) creating biological corridors between protected areas thereby reducing the fragmentation of wildlife habitat, (2) creating buffer zones between wildlife habitat and cultivated areas, thereby protecting farms from destructive wildlife, and (3) drawing down significant amounts of carbon from the atmosphere. The farms would be economically viable through the sale of crops and fodder for farm animals, with long-term harvest cycles in timber. This plan addresses the root cause of climate change while being less vulnerable to those changes.



Limes Of Belize By Mary Susan Loan

Lime is citrus genus of the family *Rutaceae*. Common species growing in Belize include Tahitian or Persian (*Citrus latifolia*), key lime (*Citrus aurantifolia*) and Rangpur or Jamaica lime (*Citrus limonata*).

Belizean open-air market places are the best places to find favorites: (1) classic Tahitian and Persian green limes, one-anda-half to two-and-a-half inch ovoid fruit with few-to-no seeds, (2) smaller, paler key limes, and (3) the variety known as Jamaican limes: juicy, seedy, and sour with orange skin and orange interior. Jamaicas can be used as a substitute when green limes are not available. All are tart, juicy and aromatic with a hint of sweetness.

Limes are believed to have their origin in the Indonesian archipelago and were likely dispersed to Mediterranean countries by Arabian traders dating back to 1000 AD, and later by the Crusaders in the 12th and 13th centuries. Limes were introduced to the Caribbean region, in the 15th century by the Spanish conquistadors. For many centuries, the British Navy depended on limes to help prevent scurvy, hence the seaman's nickname, limey'.

Limes are easily grown in backyard gardens from seed or by grafting. Lime trees are compact and generally grow to be no more than fifteen feet high with thorny bush-like branches and shiny green leaves. Trees thrive in the sun and are benefited by the use of fertilizer and compost. Lime trees grow at the rate of thirteen to twenty-four inches each year. Seedling trees begin to blossom and bear fruit in three to six years and reach full production in eight to ten years. Trees are susceptible to wind and water damage, mites, fungus and diseases including the pesky Asian Citrus Psyllid, which is the cause of the highly destructive Huanglongbing citrus disease. Weather and insect damage can create lime shortages in Belize and are responsible for periodic lime shortages and the resultant spikes in cost.

Limes are a versatile ingredient for many recipes, including beverages, dressings, salsa, pies, cakes, soups and Tex-Mex. Limes are also good for digestion, weight loss, and have proved helpful for treating respiratory and urinary ailments. Limes are also used for making cosmetics and cleaning products. Citric acid and citrate of lime, prepared from the fruit are used as a flavoring agent and preservative.

To help get maximum juice from a lime, cut it open and use a fork to mash up the pulp before squeezing. Easy lime beverage recipes: <u>Lime leaf tea</u>: wash, then chop a large handful of lime leaves, simmer in one quart of hot water for fifteen minutes. <u>Hibiscus sorrel limeade</u>: two cups sorrel juice, juice of one lime, honey to taste and a pinch of salt. Mix all ingredients together and serve plain or over ice.

India, Mexico and China are presently the largest global producers of limes and lime products. Belize has potential for growing and exporting more limes. In March 2018, to remedy a lime shortage in Belize, 130 boxes of limes were allowed to be imported from Mexico to Belize to ensure enough limes are available until the Belize lime harvest resumes in the coming months. Jose Abelardo Mai, PUP party spokesman for agriculture estimates, "It takes about \$500,000 to establish enough acres of lime to supply the entire country."

Every backyard garden lime tree grown will help ensure a supply of fresh limes. Look for lime trees in local tree nurseries or grow your own from seed.



A Book Review: Tuning Into Nature By Phillip S. Callahan, PhD Reviewed by Chris Harris



This book, subtitled, "Infrared Radiation and the Insect Communication System", might seem a bit of a handful at first glance. Full and complete understanding of its contents may come only with a degree in physics and perhaps degrees in electronics and biology thrown in. That said this is a very interesting read even for the lesser mortals amongst us, and even gives the reader a couple of surprises along the way. The latter, I would submit, is a sign of a useful and important book.

The book splits into three linked areas of interest. The first is a commentary on the discovery and development of our understanding of radiation and its relationship to electro magnetism. This subject is one we mostly take for granted and we go through our lives blissfully unaware of its crucial importance. The work which led to the development of modern electronics such as radio, TV, telephones, X-rays, and many more examples has been variously attributed to the likes of Edison, Marconi, Roentgen, Westinghouse, Hertz, and J. J. Thompson. So here comes the first surprise. A man by the name of Nikola Tesla, a scientist from Yugoslavia (as was) arrived there first in each case.

Were it not for the fact that Tesla was a loner, perhaps a bit of a maverick, and did not publish scientific papers for review as the conventional scientific community has done for centuries, and that in his later years he actually turned down a Nobel Prize, history would look quite different. However Tesla did take out some 90 patents in the early 1900s and so the evidence is there if not acknowledged by the scientific community. Tesla's work contributed greatly to our understanding of electro-magnetism and the transmission of radio waves.

And so to the second area. This section, probably the heaviest going, deals with how the parts of the light spectrum we cannot see with the naked eye (e.g., infrared and ultra violet) play a vital part in life on Earth, and the theory behind this. This leads to the author's own lifetime interest - how insects utilize short wave infrared transmissions in their daily life. And before you say "so what?" let us move on to the third part of the book, which answers this very question.

By understanding how insects navigate, mysteries such as why moths fly into candle flames but not wood fires, why a cabbage butterfly hones in on a cabbage plant and not a potato, how insects can fly at night and find each other for mating etc., we have a very valuable control tool. So here comes the second of the two promised surprises. Insects transmit and receive very specific infrared transmissions and can interpret incoming radiation

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(sometimes incorrectly as in the case of the confused night flying moth flying into a candle flame). Of far more significance however is the fact that by mimicking a specific infrared wavelength transmission, we can "summon" insect pests to us for the purpose of eradication. This method is still in its infancy but the author is convinced, with good reason, that the future of airborne insect pest control lies in this direction. Who would have thought that insects have a sophisticated inbuilt radar system that we mere humans could only replicate in the early days of World War 2 in 1940? It's food for thought.

So a very interesting book, frankly quite challenging at times but an enquiring mind will find much to think about. And, oh, by the way, the maverick scientist Nikola Tesla has (sadly) no connection with the automobile manufacturer of the same name making electric cars in today's modern world. Just for the record, one of the very first electric models was named after Tesla and the company which sprung from that, adopted the name Tesla.

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AG BRIEFS

UB CF The University of Belize College of Agriculture will host a 4-day Soil Fertility Course, Intro 2, on September 3-4-5-6, 2018, by noted

soil consultant Neal Kinsey of Kinsey Ag of Charleston, Missouri. Participants may register now for the limited enrollment course, via David Thiessen, at thiessenliquid@gmail, agrobase.bz@gmail.com or 670-4817.

The Caribbean Food Crop Society (CFCS) will hold its 54th Annual Meeting at the Ramada Princess Hotel and Casino in Belize City



from July 8th to 13th, 2018. The public and students are invited to attend. Interested parties may register in advance with CFCS via Dr. Alberto Beale, alberto.beale@upr.edu.



Regeneration International and Regeneration Belize present Transforming Tropical Agriculture: Conference for All Belizean Farmers on 14-15-16 November 2018 in Belmopan. For details see pg

21 this issue or go to www.regenerationinternational.org/belizeconference-2018

Eco-Ag The 2018 ACRES USA



Conference & Trade Show is scheduled for Decembe 4th -7th, in Louisville, Kentucky. More information: info@ acresusa.com



Pumpkin ketchup: Jamaicans Richard and Sandra McLeish recognized opportunity when they realized Jamaica's 5th most produced crop, pumpkins, were also very much under-utilized. Their business, Sankhard Company, is dedicated to creating an entire line of pumpkin products. Their pumpkin ketchup is favorably priced

compared to tomato ketchup. Sankhard's pumpkin products, including ketchup and their canned pumpkin coconut soup were showcased at Expo Jamaica 2018 in April.

The General Court of the European Union "restrictions introduced at the upheld EU level in 2013 against the insecticides clothianidin, thiamethoxam and imidacloprid because of



For Information on the status of the Iguana Creek Bridge

waters rising or falling, out of water, under water, go to iguanacreekbridge.blogspot.com

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

| 5 | Local an Fuel | d Regiona Prices | Ì Ì ★Same |
|---------|------------------|-------------------------|------------------------|
| | Cayo, Belize | Quintana Roo, Mexico | Peten, Guatemala |
| REGULAR | \$11.24 Bz/Gal | ↓ \$6.76 Bz/Gal | ↓ \$7.96 Bz/Gal |
| PREMIUM | \$11.46 Bz/Gal | ↓ \$6.99 Bz/Gal | \$8.23 Bz/Gal |
| DIESEL | \$10.70 Bz/Gal | ♦ \$7.21 Bz/Gal | ↓ \$6.52 Bz/Gal |

the risks those substances pose to bees". Greenpeace spokesman that "this ruling sets the EU's priorities straight ... its primary duty is to protect people and nature, not company profit margins". All 3 of these chemicals are referred to as neonicatinoids, which are wellknown for the many studies showing their damages to bee populations. The General Court of EU ruling can be appealed before the European Court of Justice within 2 months. Neonicatinoids are legally registered in Belize.

Vanilla prices: Madagascar provides 79% of the world's vanilla. Shortages there have a wide ripple. According to Cook Flavoring Co, 2011 prices of \$11. USD per pound shot up to \$193/lb. in 2016 and in May



some sources quoted \$363/lb. (\$800 USD/Kg.), a price much higher than silver which at print time was \$264 USD/lb. (\$16.53/ oz). Dessert makers groan at the increases; vanilla extract soars to over \$400USD/gal. - up from about \$100USD/gal. just 5 short years ago. Vanilla prices are known to be cyclical; no one knows when they will drop. Regardless, Belizeans especially in the South, might do well to investigate propagating spice crops.



The Ministry of National Development's **Rural Water Supply Unit hosted a Well** Drillers' Workshop from 17th to 20th April, 2018 in Belmopan and in the field. The first day was composed of theory sessions,

facilitated by Mr. Terry Watkins of GeoScience of Clarement, California. Presentations entitled Fundamentals of Geohydrology, Local Geology, Well Sitting/Drilling Methods, Well Drilling Sequence, Well Development, Aquifer Testing/Aquifer Testing/ Disinfection and Well Site Safety were well received.

BIOCHAR: Commercial chicken farms produce an impressive amount of poultry litter. West Virginia, USA farmer Josh Frye formerly burned his litter to help heat his chicken houses. West Virginia University extension agent, Tom Basden, who



specializes in nutrient management, explained to Frye the virtues of biochar. Frye recalls that Basden told him "you will end up growing chickens mainly for the poop". However, now understanding more about the process and after purchasing a gasifier from Coaltec, the American representative for Canada's Westside Energies, Frye feels that Basden might be right. Poultry litter to biochar, has a mass



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Spanish Lookout Rescue Team responds to all calls; accidents, house calls and private transfers. We respond to all Road Traffic Accidents FREE of cost, taking the patient to the nearest hospital, but charge for private calls and transfers. Cayo district is our main area but we respond as far as Stann Creek, Guatemalan border, and mile 31 on the Western Highway. We take patients as far as Flores, Guatemala (assist till Guatemala city) and Chetumal, Mexico.

The EMTs are trained to meet or exceed standards set by BERT and are retested every year. We've also been giving First Aid classes to schools and other organizations.

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reduction of 5:1. Still, looking at the math of selling poultry litter at \$5. USD/ton compared to selling PL (poultry litter) biochar for \$480. USD/ton, there is still almost a 20-fold price gain. The lab tests on Frye's PL biochar show ranges of 1.7 to 3.2% phosphorus and 5.4 to 9.6% potassium.

The International Biochar Iniative (www. biochar-international.org) defines biochar as follows: A solid material obtained from thermochemical conversion of biomass in an oxygen-limited environment. Biochar can be



used for a range of applications as an agent for soil improvement, improved resource use efficiency, remediation and/or protection against particular environmental pollution and as an avenue for greenhouse gas (GHG) mitigation. In addition, to be recognized as biochar, the material has to pass a number of material property definitions that relate both to its value (e.g., H/Corg. ratios relate to the degree of charring and therefore mineralization in soil) and its safety (e.g., heavy metal content). See http://agreport.bz/2017/08/ biochar-implementation-in-agricultural-systems-of-belize/ for an article on Biochar by Belizean Gerardo Aldana. Aldana is currently finishing up his PhD studies, focusing on biochar and its abilities to remediate soil.



Substitutables: The Directorate General for Foreign Trade (DGFT) reports that the seasonality of locally produced fruits and

vegetables is reflected in the import data of agricultural products. The annual total value of imported fresh produce exceeds BZ\$8,300,000. The increase in tourism creates high demand for fresh produce and is an opportunity for local producers to satisfy that demand. The weight in pounds and Belize dollar value, respectively, of imported products include onions - 2,880,242 (\$1,393,887), potatoes - 4,082,231 (\$1,283,211), lettuce - 844,408 (\$388,337), carrots – 1,095,810 (\$325,091), broccoli – 329,725 (\$128,100), cauliflower - 339,880 (\$119,782), kale/kohlrabi -17,239 (\$108,054), celery - 26,984 (\$86,858), sweet peppers -56,484 (\$67,738), sweet corn - 60,509 (\$52,393), cabbage - 216,904 (\$47,008), papayas - 93,890 (\$46,782), whole peppers - 15,212 (30,738), beets - 40,603 (\$20,637), asparagus - 7,749 (\$15,322), shallots - 3,743 (\$14,111), brussel sprouts - 2,862 (\$12,658), thyme - 1,728 (\$7,113), muskmelons - 4,916 (\$6,784), spinach - 1,607 (\$6,414), sweet potatoes - 4,890 (\$5,599), pumpkins - 3,886 (5,582), and tomatoes - 1,588 (\$5,489). The details of agricultural imports are online; see them at www.agreport.bz.



Please go to our online edition (www.AgReport. bz) **to find a more expanded version of the** *Ag Briefs.* Find blurbs on: *Newly-discovered exploding ants; What is 'vegan leather'?; Shoes created from pineapple waste; More shoes- from mushrooms, chicken feathers & textile waste; Germination times vary as survival strategy...*

Notice: Under Archives in the top menu at AgReport.bz, find all our printed issues back to 2009 replicated in PDF.

BLPA 40th AGM...Continued from pg 23

by Mexico on live cattle exports [by Belize], which many consider a barrier to trade.

Drs. Depaz and Tesecum of BAHA shared updates on the bovine rabies situation. The cattle cases are confirmed to be from bat vectors. In 2017 reports indicate 57 cases; however the affected numbers are believed to be under-reported. The vets cautioned that ranchers should take care that all vaccines are maintained in the cold chain until given; if the cold chain is broken, 'vaccinated' animals can still get rabies.

Mr. Andrew Mejia discussed the Taiwan supported *Sheep and Goats Genetic Improvement Project* (see pgs 25,26 this issue). Estimates are that there are 203 sheep farmers and that the national herd is approximately 12,000 head.

Eight of the sitting directors were present: Chair Henry Canton, Richard Penner, Ramon Galvez, Elston Wade Jr, John Dyck, John Banman, Ralph Moody and Arlen Edwards. Missing due to illness was Fred Hunter Sr. After the business session finished, elections were held to replace the outgoing directors: Ramon Galvez, John Dyck, and John Banman. These 3 were all re-elected. New officers elected by the board were: Chair: Elston Wade Jr; Vice Chair: Ramon Galvez; Secretary/Treasurer: Ralph Moody.

A small cattle auction with John Carr as auctioneer was held right inside the meeting area following the meeting.

Reported by B. Roberson



100 ac close to San Ignacio: ideal for resort or development, fiber optic for internet, power onsite, amazing views of Macal River and surrounding area, roadwork in. Connecting river property available Ask about financing



Regeneration Inter Works...Continued from page 21

regenerative approach to raising livestock. Phiri has been busy lately organizing the "4/1000 Africa Symposium on Soil for Food Security and Climate" in conjunction with the 4/1000 Initiative and the New Partnership for Africa's Development (NEPAD) Agency. The symposium, scheduled for October 24 - 26 in Johannesburg, South Africa, will bring together the public and private sectors to discuss how to engage stakeholders around the world in the transition to productive and resilient agriculture, based on sustainable land management and to generate jobs and income, synonymous with sustainable regenerative development. RI works closely with France's 4 per 1000: Soils for Food Security and Climate Initiative.

Guatemala: Regeneration Guatemala, which is now formally organized as an independent tax-exempt nonprofit organization, coordinates directly with RI to serve as the Guatemalan anchor for the global regenerative agriculture movement. The Guatemalan alliance has engaged small farmers, communities and market forces in deploying a national poultry-centered regenerative agriculture system design as an alternative to industrial poultry production.

Regeneration Guatemala's other activities include engaging the national scientific, agricultural, and activist communities in a narrative about the relationships between healthy soils, food and the climate; unifying the national grassroots people through a diversity of messages and campaigns to appeal to different segments of the national body politic, including consumers and environmentalists; and collaborating with universities and NGOs to train farmers in organic regenerative farming and land management techniques.

Mexico: RI collaborates closely in Mexico with Vía Orgánica, a sister nonprofit organization based in San Miguel de Allende. Vía Orgánica operates an organic regenerative teaching farm just



outside the city, and in the city, an organic market and cafe which purchases food products from more than 200 local farms. In September, Regeneration Mexico will co-host a migrant summit in San Cristóbal de las Casas that will draw attention to the role regenerative agriculture can play in ending forced migration. The summit will be modeled after a similar one RI helped organize last year in Guatemala.

U.S. (Midwest): In the U.S. plans are shaping up for a fall launch of Regeneration Midwest (RM). RI is collaborating with organizers in 12 midwestern states and the Minnesota-based Organic Consumers Association on a strategy aimed at transforming "America's Breadbasket," currently dominated

by factory farms and GMO monoculture commodity cropping, by engaging existing and building a new regenerative trade and commerce infrastructure and the corresponding market and policy support systems. Regeneration Midwest will build strategic frameworks and partnerships capable of supporting the scaling up of promising new agriculture production models and technologies that have the demonstrated capacity to scale. Furthermore RM will build a robust supply chain of verified and approved regenerative product lines and brands with clear competitive advantages. Ultimately the Regeneration Midwest alliance will create a permanent regenerative agriculture campaign with a clear direction to build and expand markets, support the deployment of regenerative farmers and draft and carry through critical and targeted legislation and ordinances needed to support regenerative farming in all 12 participating states.

RI is also working in Panama, Honduras, India and other parts of the world, and is aligned with other national and state nonprofit organizations, including Regeneration Canada, Regeneration Vermont, Regeneration Massachusetts and Regenerate Nebraska, Regenerate Iowa and others.

Spanish Lookout Expo...Continued from pg 14

boating, buggy and "train" rides, trampoline jumping, the new "joy ride" was the biggest hit. Eight seats were attached to the cables of National Crane Service's high crane that lifted the daring riders 120 feet into the air for a spectacular view of the surroundings and down into the lake for anyone who wanted to dip his/ her feet into the water and back to terra firma. And no one should have gone away hungry; there were over 15 food vendors with plenty of food and a large variety to choose from.



The agricultural section had a selection of farm animals including beef cattle, horses, pigs, and other animals to the delight of youngsters.

The Expo committee plans to build another large covered structure for future Expos.

All Expo photos were taken by DM Designs of Spanish Lookout.







Non-Anti-biotic fed

It is important to know where your food comes from and to know that it is being produced in a safe, healthy, and ecologically friendly manner.

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