The Belize Ag Report

Belize's most complete independent agricultural publication

FRUIT-FULL: SOLAR DRIED FRUITS OF BELIZE.

By Jack Nightingale

'Fruit-Full', producing organic, high quality, solar-dried fruits, is a business project designed to bring sustainable futures to the indigenous and native populations of the Central American and Caribbean region. Located in southern Belize, Fruit-Full works with Sustainable Harvest International (Belize) and Plenty Belize, non-governmental organizations associated with agriculture, through trainings and field work.

The products of Fruit-Full are the maximum health and quality tropical fruits of the region, dehydrated in solar dryers and full of nutrition. Our motto, "nothing added but the sun" holds for all fruits except mammee, cashew fruit and star fruit (carambola), which have honey added because we have found it enhances the finished product. Drying fruit is labor intensive and quality handling is the watchword. All participants, from farmers through processors and shippers, are aware of the need for quality.

Drying Technology

There are two known solar drying techniques: direct drying and indirect drying. The most technical aspects are with indirect drying methods. The equipment can be expensive to build and require motor driven fans to move the heated air. Direct drying is simple technology but the box design is important. Fruit-Full employs direct drying technology and has developed an industrial form of direct dryer using angle iron, plywood or cement board, table cloth plastic and insect screen for fruit support. Our design allows for local maintenance at relatively low cost which is another reason we have chosen direct drying.

Drying is, of course, a relatively simple concept. Heated air expands which leaves more room for water molecules to be taken up by molecules of expanded air. Moisture is at the surface of the cut fruits. By causing air to pass over these surfaces it also causes the moisture at the surface to be collected. To have the air move one must create convection currents in the box. The inside of the box is painted black so that heat is absorbed at the surface which then accumulates in the box. Hot air rises and this is important to the passive machine we create. The hot air escapes through the holes at the top of the box. Once escaped, it leaves a pressure (negative) in the box. This is felt by the air outside the box as a pressure differential. Air then enters at the bottom holes, is heated, completes the convection cycle and sets up patterns of air movement, which is the total function of the drying box.

Relative Drying Times

Pineapple takes a good two solar days to dry as does mango. Banana takes anywhere from 1.5 to 2 days. Sapodilla can dry in 1 day (depending on thickness) Mammee dipped in honey takes 1.5 to 2 days and cashew dipped in honey takes 1 to 1.5 days. Sorrel for tea (Flor de Jamaica) takes 1 day. Moringa takes 2 solar -3 solar hours and this is similar for leafy herbs. I have dried chaya leaf for tea and that takes 3-4 hours. Clearly the juicier the fruit the more the dryer has to work to dehydrate. I have made blended fruits in a blender such that soursop flavor dominates the mix and dried a fruit leather which also takes 2 days. I have noticed that solar days vary greatly and that also must be taken into account. Recently a batch of pineapple in 1.5 days had already become brittle.

A Labor Intensive Enterprise

Fruit-Full products are grown and harvested by hand. This means extensive labor in land preparation, fertilization, cultivation and actual harvesting. Purchase prices of fruits must bring to the farmer the best of prices and is reflected in the end price of the product. Fruit handling and processing, from slicing, setting on drying screens, removing from screens, sorting, weighing, bagging, sealing and final packaging, all done in the cleanest manner, are also hand labor reflected in the end price.

Organic Certification

We wish to encourage the development of affordable certification for indigenous and resident cultural farmers who cannot afford expensive certification. We are part of a movement to develop local organic certification which will meet all of the highest standards.

Contact Information

We can build you solar drying boxes and will gladly enter negotiation with anyone interested. Contact us at gardenflush1@yahoo.com.uk or telephone 501-667-9648.

Feed your kids something good.
Feed your kids as though you mean them to survive until tomorrow.

To THE EDITOR

Editor's note: The Belize Ag Report acknowledges and respects the need for dialogue among the agricultural community. Publication of a letter or an article does not indicate endorsement by The Belize Ag Report of the views and content therein.

Dear Editor,

Thank you for the opportunity to express an opinion in your newsletter.

I have had the honor and great privilege to work for decades with traditional healers of Belize to record and preserve their ancient systems of medicine. With Dr. Michael Balick of the New York Botanical Garden, we have published several books on the subject. This year, Oxford University Press will publish The Ethnobotany of Belize, a 700 page tome that represents our work with man and the land in Belize. I have just finished reading a report on the website of The Organic Consumers Association of America entitled, GMO Myths and Truths. As an organic farmer in Belize since 1976, I am concerned that the safety and integrity of our food supply is on the brink of a dangerous and major shift. Monsanto's genetically modified (GM) crops are promoted on the basis of a range of far-reaching claims from the GM crop industry and its supporters.

They say that GM crops:

- Are an extension of natural breeding and do not pose different risks from naturally bred crops
- Are safe to eat and can be more nutritious than naturally bred crops
- Are strictly regulated for safety
- Increase crop yields
- Reduce pesticide use
- Benefit farmers and make their lives easier
- Bring economic benefits
- Benefit the environment
- Can help solve problems caused by climate change
- Reduce energy use
- Will help feed the world.

However, a large and growing body of scientific and other authoritative evidence shows that these claims are not true. On the contrary, evidence presented in this report indicates that GM crops:

- Are laboratory-made, using technology that is totally different from natural breeding methods, and pose different risks from non-GM crops
- Can be toxic, allergenic or less nutritious than their natural counterparts
- Are not adequately regulated to ensure safety
- Do not increase yield potential
- Do not reduce pesticide use but increase it
- Create serious problems for farmers, including herbicide-tolerant "superweeds", compromised soil quality, and increased disease susceptibility in crops
- Have mixed economic effects
- Harm soil quality, disrupt ecosystems, and reduce biodiversity
- Do not offer effective solutions to climate change
- Are as energy-hungry as any other chemically-farmed crops
- Cannot solve the problem of world hunger but distract from its real causes - poverty, lack of access to food and, increasingly, lack of access to land to grow it on.

Based on the evidence presented in this report, there is no need to take risks with GM crops when effective, readily available, and sustainable solutions to the problems that GM technology is claimed to address already exist.

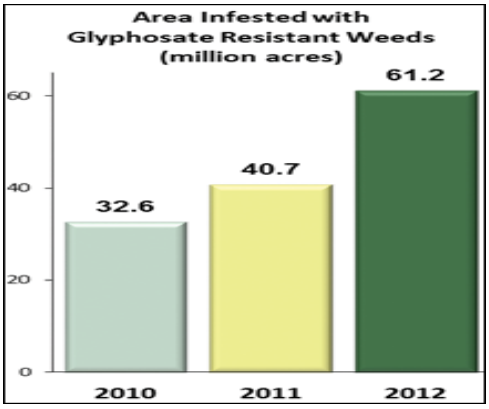
Conventional plant breeding, in some cases helped by safe modern technologies like gene mapping and marker assisted selection, continues to outperform GM in producing high-yield, drought-tolerant, and pest- and disease-resistant crops that can meet our present and future food needs.

We are what we eat so we should be sure that our food comes from the earth and not conjured up in a laboratory.

Rosita Arvigo, DN
Rainforest Remedies
Sta Elena, Cayo

Dear Editor,

While the GM issue is on the front burner here in Belize, a related issue is that of the efficacy of glyphosate as an herbicide. It comes as a package deal with glyphosate-resistant GM crops. In other words, use of glyphosate-resistant GM seed requires the farmer to also use glyphosate with the GM crop or there is no advantage to the genetic modification. Weeds resistant to it in North America, that great agricultural laboratory Belizeans can learn from, are increasing to where, according to Kent Fraser of Stratus Inc., an ag research organization (www.stratusresearch.com/blog07.htm), about half of America's farmers have now found glyphosate resistant weeds on their farm in 2012, up from 34% of farmers in 2011. In the warmer southern states, the incidence is higher; it is 92% in Georgia. The article includes the following chart showing the rapid loss of effectiveness of glyphosate as an herbicide. Any serious deliberation about the introduction of glyphosate-



resistant genetically-modified crops in Belize should adequately - and squarely - address these facts along with the equally serious problem of its toxicity. These reported results of investigations are not merely proclamations as so many claims about the benefits of GM crops are. They do not paint the glowing picture of green dollar signs that some GM advocates would like to imagine.

Dennis Feucht

Continued on pg 26

Mission Statement:

The Belize Ag Report is an independent bi-monthly 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.

GMO TECHNOLOGY – FEAR OR FUTURE?

By Hugh O'Brien

Belize Grain Growers Association

"Cómo me arrepiento no haberme impuesto y haber dicho no a tanta novelería" Rafael Correa, President of Ecuador, September 1st, 2012.

"How do I regret not insisting and instead saying no to such a novel technology?" These are the words of Ecuadorian President, Rafael Correa, as he delivered his weekly Saturday address to the nation on September 1st, 2012. During his stunning speech, President Correa publicly apologized, saying '**it was an error**' to have declared "Ecuador as a country free of transgenics in the Constitution". President Correa strongly opposed what he called opposition to genetic engineering by "fundamentalists who are afraid of the truth".

Following in the footsteps of the Ecuadoran President, Mark Lynas, the environmentalist and award-winning science author, began 2013 by publicly apologized **"for having spent several years ripping up GM crops"** and for his role in helping to spearhead the anti-GMO movement in the 1990s. Mark Lynas was very practical as he delivered his famous speech at an Oxfam conference on January 3rd, 2013 – "You are more likely to get hit by an asteroid than get hurt by GM food. In fact, the idea of being totally anti-GMO is no longer a position to take if we are to be reasonable in our thinking.

However, if we were to follow the misinformation, pseudoscience, read arguments presented against GMOs then we would immediately stop eating red apples, as the red apple is a mutation arising from green apples and therefore it is not a normal or natural apple. Red grapefruits were produced in the laboratory using a mutagenic chemical called Colchicine that induced the red color as a mutation and so we would have to discard red grapefruits from our fruit basket. If we were to listen closely, we would have to be against the artificial manipulation of chromosomes, and therefore we would only be able to eat the very seedy wild diploid (meaning 2 sets of chromosomes) as this is the only normal or natural banana. Over the years, plant breeders have genetically manipulated bananas to have 3 (triploid) and now even 4 sets of chromosomes (quadruploid), both of which are abnormal, or as some may say very un-natural. In fact we would have to stop eating flour as it comes from the wheat plant which has been genetically manipulated to be worse than bananas as it is a hexaploid with 6 sets of chromosomes, instead of the normal 2 sets.

The list of foods that we would have to stop eating does severe surgery to our diet. We would have to cut out seedless watermelons, seedless grapes and even Washington navel orange from our diet as these are all mutations, some natural and others artificial. In fact, we would have to stop eating at least 50% of the food we currently consume and we would have to stop using the numerous GMO produced pharmaceuticals including insulin, hepatitis B vaccine and plasminogen activator used for heart attack or stroke patients. Government will need to stop the importation of all soybean oil, canola oil, corn oil, and 1-2-3 oil, we would have to drop chickens (and eggs) and pork from our diet, as they are all fed GMO soybeans, and in many cases are also fed GMO corn. The drinking of soft drinks, sweet drinks,

Continued on pg 22

Energetic Agriculture & Pests
Farming Without Chemicals

By Bill Lindo

When Albert Einstein's $E = mc^2$ burst on the world scene over eight decades ago, mankind's knowledge of God's universe suddenly exploded, especially after he met Frank LaMotte and Carey Reams. The trio worked out how to translate some of the secrets of God's universe into formulas suitable for farm applications – taking apart the atom and putting it back together in farming for mankind's sustenance.

The lofty Platonic abstractions given by Einstein to Reams and LaMotte later became Dr. Carey Reams *"Biological Theory of Ionization"*. But for Reams' theory to be helpful to farmers, they need instruments to measure what happens in the soil and plant. This is where Frank LaMotte, the chemist, comes in; today the LaMotte agriculture test kits and instruments (www.lamotte.com) are still the most reliable because they measure what nutrients in the soil are readily available to the roots of the plant, not just what is in the soil.

Agricultural Schools of Thought

Today agriculture is divided into three different schools of thought: the *Organic Farming* (Sir Albert Howard, and Lady Eve Balfour); *Conventional Agriculture* (petrochemicals/bio-engineering companies and USA land-grant universities - the dominant worldview); and *Energetic Agriculture* (Dr. Carey Reams & Emeritus Professor Dr. William A. Albrecht).

The main question driving commercial agriculture today, not only in Belize, but planet-wide is the question: *can commercial agriculture be productive without the use of rescue chemicals*? Recently, Dole Corp decided to use energetic agriculture to grow all its crops in the United States so it can supply nutrient-dense-pesticide-free foods to its customers. In this question also is the current debate on genetically modified plants, or transgenic plants.

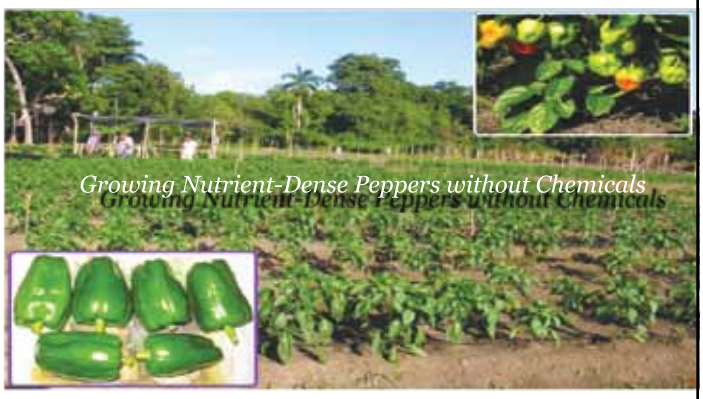
A few years ago, Charlie Walters wrote in ***Acres USA***, that what we call science is really just *"a procedural aspect that calls for setting up experiments that eliminate other possibilities...The backbone of the scientific system has to do with asking the right questions. A scientist can only ask the right questions after his life has absorbed the experiences that lead him to a vision of the Creator's handiwork, hence the right question. In the final analysis, new discovery is accomplished by the mind and soul of the whole person and cannot be a mechanical scientific procedure."*

Healthy Soil

The problems for both the supporters of the organic viewpoint and the petrochemical/bio-engineering schools are that they see nature from a linear-entropic reductionist viewpoint. The organic farmer refuses to use any non-natural fertilizer in growing his crop. His contention that the soil must be alive is correct, but to say, "If the insects eat our crop that means it's good for us to eat" is nonsense. If insects or pests eat your crop it means that the crop is sick; and if you kill the insects and eat the sick food, then don't wonder how you get sick - if you do. As Dr. Albrecht, and Dr. Reams have remarked, the *"insects and disease pests are nature's garbage collectors; weeds are nature's caretakers."* Dr. Phil Callahan – the greatest scientist of the late twentieth century -- in his many insect experiments has proven the correctness of that statement.

If the soil is not alive and does not have the correct number of elements of the Mendeleyeff"s Periodic Table in the correct ratio, then the crop we grow on that soil will produce insects or diseases, and the soil, weeds. *All life is energy*. When we add fertilizers to soil, we add energy in what Dr. Reams called cations and anions which he describes *from an electrical point of view, as opposed to wet chemistry*. For instance, in wet chemistry, calcium is a double positive (+ + Ca) or cation. However, Dr. Reams asked his students if calcium can carry a charge; since the answer is no, then calcium must be an anion (- Ca) or negative charge.

The major contention between energetic agriculture and conventional or mainline agriculture is the heavy reliance on nitrogen, phosphate, and especially, potassium (NPK). No allowance for biology is made, or for physics which bridges chemistry and biology. From physics we learn about energy and electro-magnetic field of the soil and how it interacts with the fertilizers, both organic and inorganic. And biology teaches us that the soil must be alive with the microbes, and the worms which break down the fertilizers so the plant roots can eat. The microbes eat first. Charlie Walters wrote in his book, ***Eco-Farm***, *"Like a banker on the hunt for higher interest rates, they [microbes] have a one track mind. Also like a banker, they have the first place at the table and take the first helping."* For instance, our two hands full with dirt from living soils contain more microbes than the current entire human population. This lack of foresight by conventional agronomists leads to a profound danger with the use of rescue chemicals.



But we also need to understand that most agronomists are not taught about energetic agriculture. The schools they attend use books written by the "high-priests" of fossil-based corporate doctrines who donate the grants that sustain the professors. Instead of teaching truth in science, agriculture teachers and farmers are being taught corporate doctrine based on greed and human control to such an extent that it's getting harder and harder for farmers to continue their profession and feed their families.

Continued on pg 24

'Apples' of Belize Series

Sugar Apple or Custard Apple

By Mary Susan Loan of Cristo Rey Village

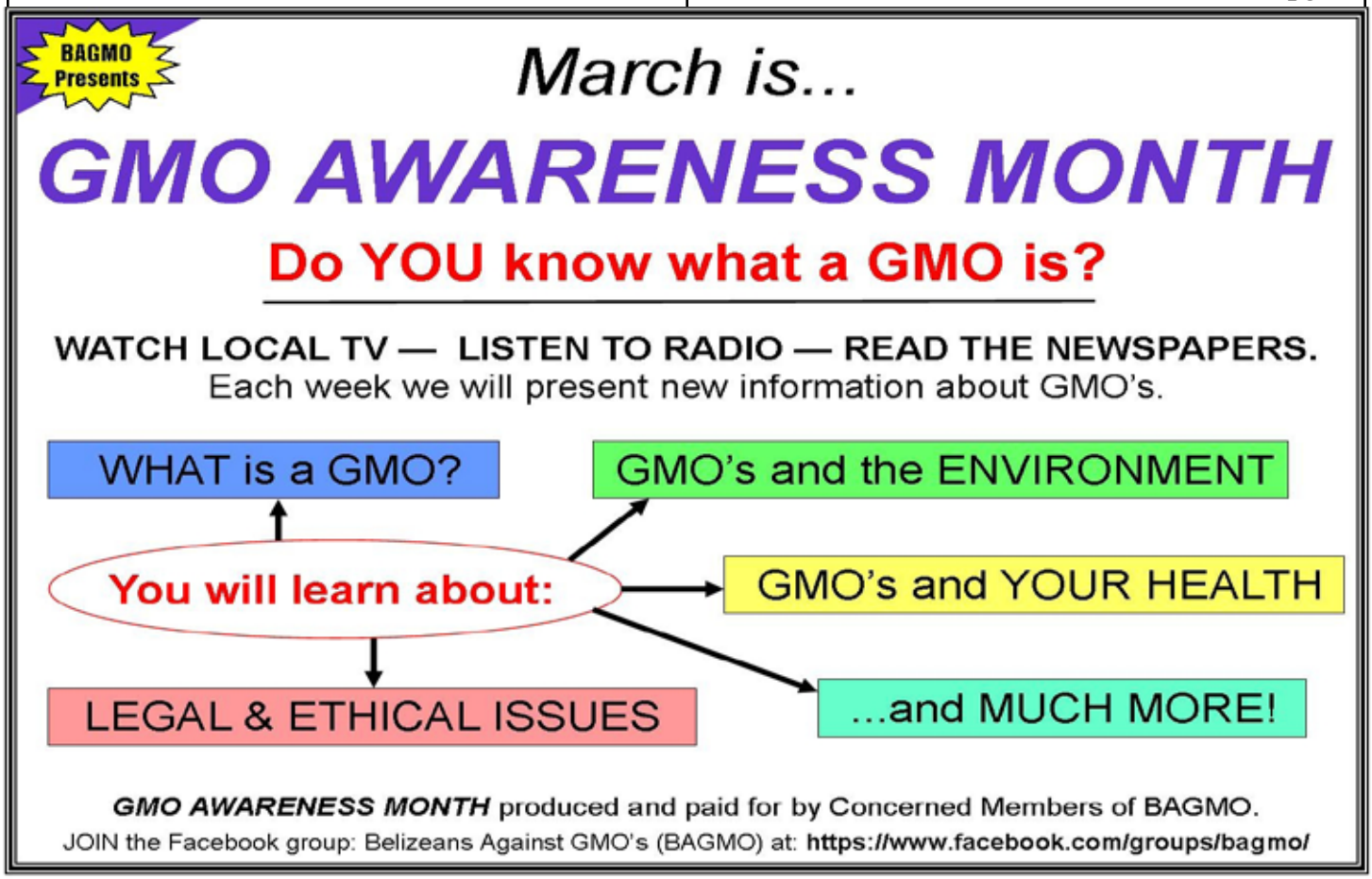
The Sugar apple is another tropical fruit that is commonly known as an apple, but the tree and fruit are not botanically members of the apple family. The Sugar apple's botanical name is *Annona squamosal*. It is the most widely grown member of the over two-thousand member Annonaceae family. Like most tropical fruits, different cultures have many names for this frut including, custard apple, vid anon de azocar, granadilla, saramoyo, pinyon, sakya, Buah nana. In India it is known as sita fruit, literally translated as "fruit with so many seeds the monkeys will not eat them". Sugar apples are close cousins to the cherimoya and atemoya, which is a hybrid of the Sugar apple and the cherimoya.

This delightful variety of annona tree is a semi-evergreen shrub or small tree which grows to be approximately ten to twenty feet tall, the trunk between ten and fourteen inches in diameter. The slender-to-wide dull green leaves grow to be approximately six to eight inches long. The Sugar apple tree usually flowers in May with tight buds making it a challenge for the bees to pollinate. Hand pollination with a natural fiber brush helps to increase yield. Apples generally fruit in June through early October. The twigs of the tree are known to grow in a zig-zag manner. Sugar apples produce about fifty to hundred fruits per tree in as little as two to three years, making the tree a good choice for the family 'back yard' garden. The tree also makes an excellent ornamental tree with its rounded canopy and long elegant branches.

Sugar apples are widely grown in El Salvador, India, Bangladesh, Pakistan, Australia, the Philippines, Columbia and other tropical South American countries as well as Jamaica and other Caribbean countries. Sugar apple trees have been naturalized throughout Florida and all the way to Bahia in Brazil. Miguel Zheng, head of horticulture at the Belize Taiwan Technical Mission in Central Farm reports that Sugar apples are being grown at Central Farm. He said the Sugar apple is very famous in Taiwan. The tree is not yet popularly cultivated in most of Central America. The origin of the Sugar apple tree has been lost in history. It is known that Sugar apples were introduced and grown in Southern Asia prior to 1590. Sugar apple trees are now so prolific they are considered an invasive species in some areas. Fruit bats help to spread the seeds, especially island to island in the Philippines. Sugar apples are also a host for the larvae of butterflies and lac producing insects.

The Sugar apple fruit is said to resemble a hand-grenade with its scaly covering of loosely cohering segments of the fruit. The skin is thick and lumpy and ranges in color from yellowish-green to a very soft gray with a white or bluish bloom. The shape of the fruit ranges from being heart-shaped, conical, or ovate. Fruit size varies from two and a half inches to four inches in diameter; weight, from 3½ to 8 ounces. There are from twenty to thirty-eight or more blackish colored seeds in each fruit which are spat out after enjoying the fruit. The fruit flesh is white to pale yellow, very soft and creamy, slightly granular, gooey, sweet and delicious with slightly minty undertones. Fruits are best harvested a few days before they reach full ripeness when the segments get too soft and separate and insects find them or they drop to the ground. They can be stored indoors for a few days to ripen then kept in the refrigerator for a few more days. Fortunately, the trees do not bear all at once; they ripen gradually, a few fruits per day. Fruits are high in iron, calcium, fiber and fructose and are calorie rich. They are best eaten out of hand or as an addition to raw smoothies and sauces once the seeds are removed by pressing

Continued on pg 11



BEYOND THE BACKYARD

PALMISTRY


Attalea cohune

By Jenny Wildman

The palm: its leaf is like the spread of a hand. I thought I would talk about palms as Palm Sunday is coming up marking the beginning of the Holy week of Easter. As Jesus entered Jerusalem palms were scattered by the faithful across his path as a sign of respect. The palm has been incorporated into the services of the Christian faith where processions involve the waving of palm branches and small crosses are made from the fronds. In 1995 Columbia banned this practice as the palm species was threatened by possible extinction due to over harvesting. Indeed there has been much controversy relating to the over cutting and destruction of palms in the rainforest for the production of heart of palm and palm oil. Now also the Bay leaf is threatened as there is a much greater demand for thatch with the growth of tourist facilities aimed at using it to create ambience in design.

Recently I needed to remove a 5 foot coconut tree from my driveway; so I decided to cut it and eat it. The edible part is about 2 to 3 feet of delicious white flesh which I used as fresh heart of palm salad, canned some in brine and cooked the rest with yellow ginger like cohune cabbage. None of the tree was wasted; the leaves were used for shade in the garden and the leftover parts as mulch. Whilst driving south I look out at the thousands of cohune palms and I find it hard to image ever running out of palm trees. However if we all start eating copious amounts, the destruction of the forest could happen in a very short time. It is said that the Jucara palm (Eoterpe edulis) was almost destroyed in Brazil with the heart of palm industry, as it is a single stem palm. Its relative, the multi-stem Acai, can regenerate which embraces the concept of sustainability; most commercial heart of palm today is Acai. With the increase in demand for coconut oil, palm oil is a booming industry worldwide. The demand has created a huge concern for the methods (or lack of) satisfying this demand and in some places a radical outcry to boycott sales. This would be devastating to small palm oil farmers. There is no reason why an industry has to be destroyed; consumers can force industry integrity e.g., by purchasing only certified and free trade palm oil.

I believe there is a huge commercial potential for many types of palms and this is the perfect climate for them. Common edible palms in Belize are:

Cohune (Orbigyna cohune or Attalea cohune): heart of palm (swamp cabbage), oil (although more tedious to produce than coconut oil but the results are wonderful) ....many other uses such as thatch

Waree (Astrocaryum Mexicanum): heart of palm, shoots, nuts and flowers

Peach Palm (Bactis Gasipaes): heart of palm, fruit

Hog Palm (Spondias Mombin): edible stems

Coconut (Cocos Nucifera): copra, oil, water. In Belize we have the Tall Jamaican, the Malaya Dwarf, The Red Mayjam and the Ma-pan.

Jippi Jappa (Sabal Mexicana): edible shoots, basket making

Pokenoboy: sweet and sour tasty fruit

Acai: grows in our swamps; its berries are touted as the new super food good for just about everything health-wise including weight loss. Apparently there are 8 varieties but I have not seen signs of these delicious and nutritious berries here.

African Oil Palm (Elaeis Oleifera and Guineesis): oil - used in food, cosmetics and fuel. I have seen ads endeavoring to discourage use of palm oil suggesting it is unhealthy for both the body and the environment. However, palm oil contains no trans fatty acids or cholesterol and is rich in natural antioxidants, especially virgin red palm oil. These have been shown to help reduce blood cholesterol, benefit the heart and protect against common health issues, even Alzheimer's. In Columbia cultivation of palms was achieved without deforestation, by using land previously used for other crops. Once planted this palm has a long life with productivity being as much as 50 years. After the oil is extracted the remaining cake is used for animal feed. Palm oil has been used since the beginning of time as a food source but gained demand in Britain in the Industrial Revolution for candle making, as a lubricant for machinery and fuel.

Research into the chemical structure of plants such as Saw Palmetto and Acai is the basis for potential medical use. Furthermore, the sapogenins found in the leaves of many palms contain steroids which may have pharmaceutical value.

Xate (Chamaedorea - 3 varieties; fish tail palm): commonly used for floral arrangements as they have luxuriant look and can last for more than a month after harvesting. More than 30 million fronds are imported into North America each year for

Palm Sunday. In Britain Palm Sunday and Mother's day fill orders costing about 4 million pounds sterling. It takes 4 years for the tree to grow, needing shade, good drainage and alkaline soil. Currently there is no cultivation of xate. It is harvested from the wild. This really makes one realize what jeopardy our jungles are in and further understand the broader issues Belize is facing. Palms are synonymous with tropical paradise; destroying our jungles and rain forest can adversely affect tourism as well as the environment.

If the answer to maintaining the environment were "in the palm of the hand" we could consult the lines of life, heart and fate to see the path of the future, not discounting natural intuition. I'll rely on my intuition that tells me to grow palms; they are stunning and symbolize triumph, victory and joy.

Palmam qui meruit ferat, "Let him bear the palm who has deserved it".

If you have any information you would like to share you can reach me at Spectarte in Maya Beach.....Jenny Wildman at spectarte@gmail.com

Birdwalk Community's Vegetable and Fruit Market is now open every Monday and Wednesday morning. You can reach Birdwalk by turning East off of the Hummingbird Hwy at St. Margaret's Village, and proceed east for approximately 5 miles.

A VISIT TO IX CHEL FARM'S ORGANIC GARDEN

By Beth Roberson & Dottie Feucht

Hippocrates' maxim "Let food be your medicine and your medicine be your food" is evident in the garden of Drs. Rosita Arvigo and Greg Shropshire at Ix Chel Farm. They shared some of their successful organic methods and philosophy with The Belize Ag Report during a visit to their Western Cayo District farm. Two gardens of approximately 18' x 18' next to their home provide herbs used in their medical practice, table food for themselves and last year over 1000 salads for participants of seminars held there.

"The sun is the worst thing and the best thing," spouts Rosita, claiming that "the sun supplies 96% of the energy to transform nutrients" for plants. But if the soil isn't protected from the sun's direct rays its ecology will be destroyed. Great attention is given to placement in either sun or shade, with some such as chayote requiring sun for the vines but the dampness provided by partial shade at ground level. Finding that level of sun exposure favored by each plant is essential. About 6 types of lettuces are grown in partial shade, none of them head lettuces, which are problematic due to moisture accumulation in the dense heads, promoting fungus. Also avoided for the same reason is head cabbage; instead, collards, kale, bok choy and other greens flourish. One of their favorites eaten daily is amaranth, locally known as calaloo. Although recognizing the virtues of chaya, (which requires boiling to remove toxins) they find amaranth much simpler to prepare.

Almost 40 years of gardening in Cayo have taught the doctors to rely on varieties that do not need 'artificial support'. For example, on finding the 'market type' tomatoes too difficult, they opt to cultivate the 'wild tomato' (aka Florida Everglades tomato). This variety is perhaps not viable commercially but many find the tiny fruits tasty and the plants hardy. No chemical pesticides or herbicides are ever used and only very rarely do they apply some of the traditional organic recipes (garlic, cayenne pepper, castor oil, etc). Their garden substantiates Dr. Carey Reams' research that very healthy plants (those with very high BRIX levels*) are not susceptible to disease or pests. Dr. Reams' world famous chart of BRIX values for various vegetables, grains and grasses has a column called 'Disease-Free' at the highest BRIX levels. Greg and Rosita stress that 'soil fertility promotes plants to develop their own best defense'.

So, along with the sun, attention to soil is paramount. As no commercial fertilizers, ground or foliar, are used in their gardens, all nutrients other than those from the sun and air must be in the soil. The soil must be an enticing blend with nutrients which enable abundant healthy soil microbes and fungi to fulfill their essential roles: protection from disease, pests and drought and transfer of nutrients. All seeds are started in trays and cups of 100% vermicast (worm humus), in a mobile wire seedbox sitting on a wagon-like base. Boxes of California Red Worms which produce the vermicast, as well as 3 compost bins are essential to the doctors' program. The nutrient rich liquid run off from the humus production is also collected. Compost bins are not turned but are filled and left to decompose, as turning increases polluting methane gas release (a more potent green house gas than CO_2). Greg is always on the lookout for very aged manure. Manure is left to age longer than the traditional time, to be certain that any feed additives, such as hormones or antibiotics, will have sufficient time to decay. Most of their garden is in raised beds, some having excavated steps of approximately 4' depth. Created to lessen back strain, they also eliminate walking on the soil. No one walks on the Ix Chel garden soil. Ground cover such as bean trash (baled after bean harvests) protects the ground both from sun baking and weeds. About 20 -30 bales/yr. fill their needs. In dry times filtered river water is hand sprayed in the very late afternoon (never in the morning or mid-day) so the ground is dampened for the night and plant roots have to reach deeper for their water.

The doctors have a favorite website, http://www.the-gardeners-calendar.co.uk/MoonPlanting.asp, which features 3 different calendars for agriculture by the moon. Timing is vital. For example, planting on some moons will produce bananas with much foliage but little fruit. The doctors also encourage gardeners to take advantage of local farming customs handed down from times when chemicals were not in use.

'Apples' ...Continued from pg 7

through a sieve. A Filipino company makes a rich and flavorful wine. The delicate fruit is not easily adapted for shipping and is best enjoyed close to home from local sellers or from home gardens.

Sugar apples thrive best when planted from seed. Patience is required as the seeds sometimes take one to two months to sprout. Seeds can be stored for up to four years. Trees may be budded or grafted to speed growth to an earlier fruiting. Sugar apples require a tropical environment to flourish. The trees generally prefer dry areas and have a high tolerance for drought. They are shallow-rooted and not particular about soil conditions and thrive in sand, oolitic limestone as well as heavy loam with good drainage. Once mature, trees are capable of producing two crops in one year. Miquel Zheng advices, "Through pruning you can harvest it about two times a year; also dependent on the different varieties, the production period can last almost year around". It is recommended to replace trees approximately every fifteen years, or when production wanes. Chalcid wasps and fungus are natural enemies to the Sugar apple.

Besides being a luscious tasting fruit, Sugar apples and the leaves and bark have medicinal applications. In Mexico the leaves are rubbed on floors, crushed and placed in poultry nests to repel lice. Fiber from Sugar apple bark is used for making cordage. In India, the crushed sweet fragrant leaves are sniffed as aroma therapy to help overcome hysteria and fainting spells. The bark and roots are highly astringent; a decoction is given as a tonic. In India the fruit is mashed, mixed with salt and applied to tumors. Green, unripe Sugar apple fruit is also used as a remedy to halt diarrhea. The seeds are acrid and poisonous. Heat-extracted oil from seeds has been used as an agricultural bio-pesticide.

New cultivars of Sugar apples continue to be developed, including seedless varieties. When in season, Sugar apples are a mouth-watering, delicious treat sold by Taiwanese vendors at the San Ignacio open-air markets on Saturdays.

The Chocolate Festival of Belize will be held on May 24,25 & 26, 2013 in Toledo District.

New John Deere 8285R Tractor Arrives in Spanish Lookout

By Beth Roberson & Dottie Feucht

One of the larger rubber tire tractors produced by John Deere was custom ordered and imported to Belize recently by Westrac Ltd. The 8285R model (8= the series, 285 = hp, R= premium package), manufactured in Waterloo, Iowa, U.S.A. arrived via Hyde's Shipping for the Spanish Lookout buyer.

The 8R series is John Deere's largest series of unarticulated tractors. These range between 235 and 360 horsepower, and the newly arrived intelligent tractor sits midway in that line-up with 285 horse power. The model boasts dual front and rear wheels, along with a computerized ILS front axle, and weighs over 30,000 lbs. The ability to run on Infinitely Variable Transmission (IVT), in which precise engine and ground speed are monitored and controlled, economizes fuel consumption. In North America this tractor comes with a Tier 4 engine, which burns low sulphur diesel, but since Belize does not have L.S. Diesel, the machine was custom ordered with a Tier 2 engine. Another benefit of a Tier 2 engine, instead of Tier 4, is minimizing the use of costly emission filters and sensors. Depending on the particular chore, this 8285R requires between 7 and 11 gallons of fuel per hour.

The overall machine spans 10.5' high, by 13' wide by 20' long and can till or plant a width of 26-34 feet, which is equivalent to approximately 12 rows of corn at the spacing of 30". It can till an average of 20 acres/hour. The 8R Series also features special high-intensity discharge lighting (HID), which illuminates the field a full 360 degrees for night time use. The 70 square feet of glass in the windshield and side windows make it easy to view operations from the cab. A special air conditioning system delivers optimum cooling for the hottest of days.

John Deere's connection to the sophisticated, satellite-based global positioning system (GPS), perched on the a.c. cab, interfaces with the main computer and assists the tractor to negotiate down rows, programming for the passes to have as little as 1" overlap. The tractor has several specialized computers to monitor and control its functions; its main computer can connect to the internet and send location and performance data via internet or cell phone. Tractor GPS use is increasing in Belize, with an estimated 30 GPS-enabled farm tractors working in Belize at this time, mainly in Spanish Lookout, Cayo District and Blue Creek, Orange Walk District.

Food Safety Standards for Export to the U.S.

Belize foods exports must meet the U.S. food safety standards under the Food Safety Modernization Act (FSMA), which was signed into law by President Obama on January 4th 2011. According to recent data from the Centers for Disease Control and Prevention approximately 48

million people in the U.S. get sick (1 in 6 Americans), 128,000 are hospitalized and 3000 die each year from food-borne disease illness. The FSMA strengthens the food safety system, enabling the U.S. Food and Drug Administration (FDA) to better protect public health by giving FDA new tools and authorities to make certain imported foods meet the same safety standards as foods produced in the U.S.

The following are among FDA's key new import authorities and mandates:

- **Importer accountability**: For the first time, importers have an explicit responsibility to verify that their foreign suppliers have adequate preventive controls in place to ensure that the food they produce is safe. (Final regulation and guidance were due 1 year following enactment.)
- **Third party certification**: The FSMA establishes a program through which qualified third parties can certify that foreign food facilities comply with U.S. food safety standards. This certification may be used to facilitate the entry of imports. (Establishment of a system for FDA to recognize accreditation bodies is due 2 years after enactment.)
- **Certification for high risk foods**: FDA has the authority to require that high-risk imported foods be accompanied by a credible third party certification or other assurance of compliance as a condition of entry into the U.S.
- **Voluntary qualified importer program**: FDA must establish a voluntary program for importers that provides for expedited review and entry of foods from participating importers. Eligibility is limited to, among other things, importers offering food from certified facilities. (Implementation is due 18 months after enactment)
- **Authority to deny entry**: FDA can refuse entry into the U.S. of food from a foreign facility if FDA is denied access by the facility or the country in which the facility is located.

For the first time, importers will be specifically required to have a program to verify that the food products they are bringing into the country are safe. Among other things, importers will need to verify that their suppliers are in compliance with reasonably appropriate risk-based preventive controls that provide the same level of public health protection as those required under FSMA. The requirements specified in the FSMA mean that Belize producers, such as the papaya industry, will need to have a quality assurance system, such as an HACCP system, implemented at the packaging facility and good agricultural practices (GAPs) implemented at the field.

Inspection Frequency

The Act establishes a mandated frequency for inspection, based on risk, for food facilities. All high risk domestic facilities must be inspected within 5 years of enactment and no less than every 3 years thereafter.

The law directs that for foreign facilities the FDA inspect at least 600 foreign facilities within 1 year of enactment and double those inspections every year for the following 5 years. This is already in place; in April 2012, FDA inspectors visited several papaya packing facility as well as the papaya fields to determine compliance with the safety standards of FSMA.

Accredited Laboratories

The FSMA requires that certain tests be carried out by accredited laboratories and the FDA is to establish a program for laboratory accreditation to ensure high quality standards.

Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption

To minimize the risk of serious adverse health consequences or death from consumption of contaminated produce, the FDA is proposing to establish science-based minimum standards for the safe growing, harvesting, packing, and holding of produce, meaning fruits and vegetables, grown for human consumption as part of its implementation of the FSMA. These standards would not apply to produce that is rarely consumed raw, produce for personal or on-farm consumption, or produce that is not a raw agricultural commodity. The new standards will be in the following areas:

- Worker training and health and hygiene: Establish qualification and training requirements for all personnel who handle (contact) produce or food-contact surfaces; establish hygienic practices and other measures needed to prevent persons, including visitors, from contaminating produce with microorganisms of public health significance.
- Agricultural water: Require that all agricultural water be of safe and sanitary quality for its intended use; establish specific requirements for the quality of agricultural water that is used for certain specified purposes, including provisions requiring periodic analytical testing of such water.
- Biological soil amendments: Prohibit the use of human waste for growing covered produce except in compliance with EPA regulations; establish requirements for treatment of biological soil amendments of animal origin with scientifically valid, controlled, physical and/or chemical processes or composting processes that satisfy certain specific microbial standards.
- Domesticated and wild animals: Prohibit animals from areas where produce is grown.
- Equipment, tools, and buildings: Establish requirements related to (1) equipment and tools that contact covered produce, (2) instruments and controls (including equipment used in transport), (3) buildings, (4) domesticated animals in and around fully-enclosed buildings, (5) pest control, (6) hand-washing and toilet facilities, sewage, trash, plumbing, and animal feces.

Market Activity at BEL-CAR

By Dottie Feucht and Beth Roberson

As the leading container exporter from Belize City, Bel-Car is working hard to fill its orders for red kidney (RK) beans and black-eyed peas. The RK bean market is good this year and Bel-Car is shipping them out as fast as they are being delivered to them by the farmers, 4 – 5 shipping containers per week bound for Jamaica. The U.S. also ships RKs to Jamaica but there are three factors currently favoring Belize (1) beans from Belize are not subject to the 40% duty the importers have to pay for U.S. beans because of the CARICOM Free Trade Agreement, (2) the drought in the U.S. reduced their yield considerably and (3) the Jamaican bins are understocked. Because of farm subsidies in the U.S. their exporters can sell beans at a lower price. When Belize does not have enough beans for the Jamaican demand, the Jamaican importers can obtain a waiver for the duty on U.S. beans and fill their bins. Bel-Car is currently able to pay their supplying farmers $1.55 vs. $1 per pound as in the past. Last year Bel-Car shipped RKs to the U.S. because they did not have enough to meet their domestic market demand. Even though 10 thousand acres of RKs are under cultivation in Orange Walk and Corozal Districts, their yields this year are reduced because of the drought they had in November and December. In Cayo the season started out dry but early rains helped the crops but the heavy rains later on damaged some of the crops; so the yield in Cayo is also not a record-breaker.

The soil in northern Belize is not as good for growing corn as in Cayo, where this past season's average yield was 4,300 pounds per acre. About 20,000 acres were planted in corn this past summer, which is up from about 16,000 acres only a few years back. Approximately 3,000 acres of corn are planted now, beans being more the norm for the winter season rotation. Bel-Car currently has 45 million pounds of corn in storage. They are in negotiations to ship it in bulk (most likely 3000 metric tons per vessel). Bel-Car usually ships ground corn to its markets, Jamaica and other Caribbean countries. Guatemala had a good year for corn; they buy from Belize only when they do not have enough of their own or cannot buy it cheaper from the U.S.

Many farmers are switching from RK beans to soy beans for their winter crop to be used for chicken production in Cayo and northern Belize. The prospect for sorghum also looks good. The problem of fungus for black-eyed peas in the Spanish Lookout area is being solved by planting sorghum (milo) which neutralizes it in the soil. Sorghum is a cheap commodity; the cost of production is much less than other crops. It grows as well in northern Belize as in Cayo. It is being used there for chicken feed in place of corn. Bel-Car began exporting sorghum to Jamaica in the last quarter of 2012 in the form of ground sorghum to be used for feed.

Agriculture Prices at a Glance- $$$$$

March - April 2013

A-B denotes the difference between 1st preference & second preference and sometimes between wholesale & retail and bulk or small amounts . Trend (H) means Higher over last 30 to 60 days (L) Lower (S) Steady.
Prices intend on being farm gate in Belize dollars - usually price per lb

Belize Cattle	T	A	B
Young strs. & bulls 750 - 1100 lbs	H	1.65 - 1.75	1.60 - 1.65
Cows & heifers for butcher	H	1.35 - 1.40	(thin)1.25 - 1.35
Heifers for breeding 500 - 800 lbs	H	1.40 - 1.45	1.30 - 1.40
Young grass cattle 350 - 650 lbs	H	strs.1.60 - 1.70	hefers1.35 - 1.45
U.S. Cattle			
U.S price -corn fed 1000 - 1200 lbs	H	1.27-US=2.54-Bz	
U.S price - feeders 600 - 800 lbs	L	1.41-US=2.82-Bz	
U.S price- calves 450 - 600 lbs	L	1.60-US=3.20-Bz	
U.S price- aged butcher cows	L	.90-US=1.80-Bz	
Belize Hogs			
Weaner pigs 25 -30 lbs- by the head	S	$90.00 - $100.00	
Butcher pigs 160 - 230 lbs	H	1.75 - 1.85	1.65 - 1.75
Belize Sheep			
Butcher lambs	S	2.00 - 2.25	1.75- 2.00
Mature ewes	S	1.70 - 1.75	1.60 - 1.70
Belize Chickens			
Whole sale dressed	H	2.43 - 2.45	
Broilers- live per lb	H	1.32 - 1.34	1.30 - 1.32
Spent hens	H	.90 - 1.00	.85 - .90
Fruits & Vegetables			
Tomatoes, cabbages, cucumbers	S	whosal-.75-1.75; ret-$1.00-$2.50	
Local potatoes	H	.90 - 1.00	.80 - .90
Local onions	S	.90 - 1.00	.80 - .90

Grains, Beans & Rice	T	A	B
Belize yellow corn	S	.26 - .28	.25 - .26
White corn	L	.25 - .27	.24 - .25
Corn, local retail (low volume)	L	.30 - .33	.30 - .31
U.S. corn 7.05 per 56 lb bushel	L	$25.18/ BZ 100#+8¢ frt. to BZ	
U.S. soy beans 14.50 per 60 lb bushe	L	$48.33/ BZ 100#+8¢ frt. to Bz	
Guatemala corn price/Peten	S	.31 - .34	.29 - .31
Belize soy beans/cwt	L	.55-.57	.54-.55
Belize milo	L	.20- .22	.19-.20
R-K's, little reds & blacks (beans)	H	1.25 - 1.50 farm price	
Black-eyed peas	L	.80 - .85 farm price	
Milled retail rice per pound	S	.93 - .95 farm price	
Citrus			
Oranges per 90 lb box-lb.solid basis	H	$8.50 Est. 2013 price	
Grapefruit per 90 lb box	L	$6.00 Est. 2013 price	
Sugar			
White sugar 112 lbs- controlled	S	.45 per bag + 3-5 cent mark up	
Brown sugar 112 lbs- controlled	S	.39 per bag + 3-5 cent mark up	
Special Farm Items			
Eggs- tray of 30 eggs	S	5.00 farm- retail .25 per egg	
WD milk per lb to farmer	S	contract .50 & non contract .45	

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

Dear Ag Readers: We have had a swinging time - things are moving. The first cattle have moved legally to Mexico.Even before that the very best 1000 & up steers were selling for 1.70 -1.80 per lb. Quality , heavy weights and a 55% - 56% dressed weight is the goal. Lesser size and quality brings lesser price.We had the driest December then a wet January and now in late February we need some rain. Corn and milo prices are sluggish; chicken and pigs are stronger. Farming is where you trade investment capital, high interest, unpredictable weather and uncertain markets to form a home run . It seldom happens; the uncertainty of it all makes a farmer get close to the soil and talk to the creator . With God all things are possible. All the best, John Carr

National Barrel Horse Association (NBHA) Belize

By Marjie Olson

March, 2012, was the inaugural NBHA Belize Race, held at the Belize Equestrian Academy. Excellent ground was brought in to prepare the arena, Farm Tek pro timers were purchased, fees were paid to the U.S., banners, barrels and flags were ready. And the season began.

We had an amazing year! Running as a professional Barrel Racing Association that is known worldwide, and following the rules and regulations, created an atmosphere of excellent sportsmanship and professionalism. With the help of Banana Bank and Running W hauling in horses most weekends, our average show hosted 24 entries in the Open and usually 18-20 in Youth. For Belize, that's a great number of entries and they all competed for NBHA GIST champion buckles. After a competitive season of 9 races we came to the last run and it was an exciting final Open and Youth race as three buckles were on the line. Two held and we had a tie; it was a perfect way to end the first season.

We were seldom rained on, seldom over heated, no arguments, no belligerent people…just good sportsmanship, great competitors and spectators and we were blessed with good weather and safety of horses and riders.

I was also blessed with Vicki Coverdale and Maruja Vargas for my announcer and times keeper, respectively, as well as the other duties they did. I am looking for another volunteer as Vicki has moved to colder pastures. Seriously…we need more help and people to offer to set barrels, keep times, announce, take entries, and pay attention for judgment calls. It's a busy day and I have to have help. SO please, volunteer.

The Belize Equestrian Academy and Barn and Grill Restaurant are the perfect location for the NBHA. The footing rivals any in the USA and we all know that's everything for a barrel race. The food is top notch and makes for a nice family meal while watching some exciting racing. However, I would love to host NBHA Belize in other districts as well, but having a decent arena is imperative. Just let me know if you think you have what it takes to bring NBHA Belize into your district and I will do my best to make it happen.

Our 2nd season will begin March 17th. We shall run 4 months (April 13, May 19, June 15) then have a 2 month break and finish with another 4 months (Sept 15, Oct 19, Nov 17, Dec 14): 8 races, 9 categories, and, once again, running for NBHA Gist buckles for the champions! In addition, I am planning on at least 1 champion saddle.

Here is an excerpt from the NBHA organization: "The National Barrel Horse Association, headquartered in Augusta, Georgia, is the largest barrel racing organization in the world. In 1992, the NBHA revolutionized the barrel racing industry by pioneering the divisional format, which allows riders of all skill levels a chance to win money and prizes in barrel racing competition". Divisional barrel racing, using the 4D format, allowing ALL competitors - from beginners to professionals, from youth to seniors - a chance to compete, learn and succeed in barrel racing, is the heart of NBHA. (In Belize we use 3D because we don't have enough entries for 4D.)

NBHA has over 23,000 members of all ages across the United States and affiliates in twelve countries: Australia, Brazil, Canada, China, France, Hungary, Italy, Mexico, Panama, Spain, Switzerland and the Netherlands and now Belize. Find out more about barrel racing's international presence at IBHF.

NBHA official home office events to date have paid out $12,157,330.00. Added money is over $2.5 million.

You may always find updates on Facebook under NBHA Belize and there is a wonderful video done by a professional TV producer from Germany, Simon Schnieder; see it at http://www.youtube.com/watch?v=AsQn8DyKTrg. I post pictures and results and any changes you need to know about. Or contact me at Shotzy08@live.com or 501-663-4609 or stop by the BEA, enjoy a steak and we can chat there.

Please join us for a day and see how Belize does NBHA!

CHAMPIONS OF 2012 NBHA BELIZE are as follows:

OPEN 1D: **Marjie Olson** 30, Sherman Herrera Fuentes 27, Assad Bedran 15, Amir Rodriguez 11, Stephawn Scott 11, Esduardo Alvarado 9 (top 5), Tre Roberson 8, John Carr 3, Val Thiessen 1, Joel Neal 1

OPEN 2D: **Stephawn Scott** 27, Marjie Olson 18, Valerie Thiessen 14, Esduardo Alvarado 12, Amir Rodriguez 9, (top 5) Tre Roberson 7, Hugh Milton 5, Isaiha Reyes 5, Kathrine Roberson 3,

OPEN 3D: **Jozane Vasquez** 19, Kathrine Roberson 15, Valerie Thiessen 15, Keenan August 14, Esduardo Alvarado 10 (top 5) Marjie Olson 9, Philip Wilson 8, Amir Rodriguez 8, Isaiah Reyes 6, Quatro Newfield 5, Santiago Juan 5, Abigail Coverdale 4, Dennis Alvarado 4, Tre Roberson 3, Joseph Cadle 3, Amberly Reimer 2, Sydney Remple 1

TEEN 1D: **Esduardo Alvarado** 24, **Sherman Herrera Fuentes** 24, Valerie Thiessen 13, Hugh Milton 9, Joel Neal 8 (top 5) Denzel Wagner 5, Dennis Alvarado 1

TEEN 2D: **Valerie Thiessen** 16, Esduardo Alvarado 15, Kathrine Roberson 11, Abigail Coverdale 5, Joel Neal 5, Jozane Vasquez 5,

(top 5) Denzel Wagner 4, Sherman F Herara 4, Dennis Alvarado 3

TEEN 3D: **Abigail Coverdale** 23, Jozane Vasquez 15, Dennis Alvarado 15, Jessica Leonard 14, Kathrine Roberson 12, Valerie Thiessen 10, (top 5) Esduardo Alvarado 5, Dennis Alvarado 1, Joseph Cadle 1

YOUTH 1D: **Isaiah Reyes** 5 YOUTH 2D: **Isaiah Reyes** 5

YOUTH 3D: **Sydney Remple** 28, Amberly Reimer 24, Peyton Gentry 22, Isaiah Reyes 10, Chase Harsta 8, Logan Harsta 8 (top 5) Jacob Wilson 5, Daniel Wilson 3

SENIOR 1D: **Marjie Olson**

2D POLES: 1D: **Amir Rodriquez** 23, Marjie Olson 12, Sherman H Fuentes 9, Hugh Middleton 5, Stephawn Scott 4, Assad Bedran 3, Denzell Wagner 3

2D **Esduardo Alvarado** 16, Jozane Vasquez 14, Stephawn Scott 9, Joel Neal 8, Dennis Alvarado 8, Isaiah Reyes 7, Abi Coverdale 6, Sherman H Fuentes 5, Kathrine Roberson 5, Cesar Xi 5, Jennifer Hartsa 4, Quatro Newfield 4, Sydney Remple 3, Val Thiessen 2, Keenean August 2, Jessica Leonard 1

The top five in all divisions of Barrels are qualified to run at the NBHA OPEN AND YOUTH WORLD SHOWS!

Chasing Belize Coconut Industry

By Maruja Vargas

The benefits of coconut are so high that worldwide demand exceeds production. According to Manuel Trujillo, National Crops Coordinator, at Central Farm, current production levels in Belize do not meet the local demand in Belize for coconut products let alone the vast export market. In addition to the increasing regional demand for green coconut water, recent developments in the world market have improved prospects for other higher value coconut products such as virgin coconut oil, coconut milk and derivatives as well as growth in use of by-products from coconuts husks and shells such as rubberized coir and coconut peat. Consideration is made on the use of coconut byproducts for bio-energy where this application may be viable and sustainable.

Health benefits of coconut include:

- Effectively treats kidney stones and gastritis
- Rehydrates the body effectively
- Maintains body fluids
- Maintains blood pressure
- Prevents skin cancer and dry skin

Like many other tropical fruits, such as bananas, coconut water is exceptionally high in potassium.

Central Farm has developed a hybrid coconut particularly suited for cultivation in Belize, the*"Maypan"*coconut. *Maypan* is a cross between the *Yellow Malayan Dwarf* and the *Panama Tall* varieties of coconut. The Central Farm Hybridization Project was initiated in response to the devastating disease, Lethal Yellowing, which destroyed over 6 million mature Atlantic Tall palms in Jamaica between 1960-1980 and, since the mid-1990s has killed a similar number of Dwarf and hybrid palms that were

Continued on pg 21

Understanding Organic Matter and Poor Soil Drainage

By Harold Vernon

My last article in Issue 19, Belize Ag Report, spoke about high organic matter in soils and the benefits of soil organic matter. There have been many reports of soils that have high organic matter content and yet crops perform very poorly on them. The key to understanding these soils is the amount of water retention and the sustenance of an appropriate water level. So then, just what are we to do to determine the appropriateness of the soil and its capacity to be productive for the crop we will plant? It is imperative that we know our soil first before deciding what to plant.

Getting to know our soil can be done by more than one method. Firstly, the native vegetation provides the first and most important clues. Physical investigation by digging a soil pit provides another. Soils all over Belize have been studied or surveyed and reports exist that provide very good information and guides as to the types and occurrences of soils. *Land in British Honduras* by Charles Wright is the seminal guide and should be used along with the consequential land use studies of Northern, Central and Southern Belize.

Un-cleared land or neighboring un-cleared land provides the first clues. Palmetto or short fan type palms and reeds always indicate swamp land. Cutting type grasses, shrubs and prickly bushes usually have small leaves. Fibrous grasses are present on the drier portions that are prone to periodic flooding. These soils are usually highly acidic.

As drainage improves we see the occurrence of broadleaf species that do not grow very tall. These soils usually have shallow amounts of leaf litter that may indicate a false improved fertility. Plant nutrients are significantly deficient or unavailable due to a saturation of water in the lower layers. Small amounts of leaf litter indicate that the organic matter layer is very shallow and represents just a re-cycling of plant foods from decomposed plant material rather than presence in high quantities.

Well-drained soils have tall broad leaf trees of many types. Cohune or taller palms will be growing and there are the occasional limestone outcroppings. These soils have a high organic matter layer caused by the large amounts of leaf litter from the broad leaf species. These soils may be rich with nutrients sufficient for a crop or two. These soils are usually neutral to slightly basic in pH.

We have soils that are underlain by limestone or limestone derived clays. We refer to these soils as calcitic; they usually have a thick under brush and broadleaf species predominate. These soils are slightly basic to highly basic.

Peaty or mucky soils are composed of very high or pure layers of organic matter. These soils, which are very good for aquatic plants but poor for dry land plants, are superb for vegetable cultivation but require good drainage and water control.

Determining the soil type and suitability requires digging a soil pit to determine the soil profile or the layers. A soil pit is a hole in the ground about 1 foot by 1 foot and deep enough to see the layers. The first layer is the organic matter layer and is usually dark brown. This layer gives way to a lighter colored layer that is the A horizon which typically, along with the organic matter, constitutes the rooting zone. Thinner zones mean that we have to cultivate plants that have shallow root systems. Our first consideration should be the type of crop that is to be planted.

If we were to dig sufficiently deep enough holes, we would find good indications of the water relationship between the organic matter layer and the subsoil in the A horizon.

Pine ridge soils and the nearest relative, the broken ridge soils, usually do not, but can exhibit high levels of organic matter at the top, that is, on top of a heavy clay layer that forms what we refer to as a hard pan, or solid layer of clay through which water cannot pass. Drainage is horizontal rather than vertical. Water usually stays longer near the surface or just below the surface rather than what occurs in well drained or even moderately drained soils. These soils are found all over Belize but the Belize and eastern Orange Walk Districts are mostly composed of these soils.

Readers are invited to share comments about the article and soil questions to Mr. Vernon at <hmvernon@yahoo.com>.

The Humble Pulse Gains Respect and Market Share

By Beth Roberson

Found in 4,000 year old Egyptian pyramids, in 11,000 year old Thailand caves, and reportedly in a Swiss Stone Age village, pulses are among the oldest cultivated crops. A staple in India, China and Asia, as well as in much of Central America for centuries, this high protein nutritious legume is beginning to be appreciated in other parts of the world. Now rediscovered and researched for fashionable and healthy culinary dishes, pulses improve the declining quality of Western diets, and serve myriad innovative purposes in processed foods. The time for pulses has come – or more accurately, returned.

About 60 types of beans, grouped into 11 families by Food and Agriculture Organization (FAO) of the UN, comprise the pulse family: (1.) dry beans (Phaseolus) - kidney bean, lima bean, Azuki Bean, Mung bean; (2.) dry broad beans - Horse bean, Broad bean and Field bean; (3.) dry peas (Piscum) - Garden pea, Protein pea; (4.) chickpeas - garbanzo Bengal gram (Cicerarietinum); (5.) dry cowpeas - black–eyed pea, blackeye bean (Vignaunguiculata); (6.) Pidgeon peas - Ahar/Toor, Congo bean, gandulels; (7.) lentils (Lens culinaris); (8.) Bambara groundnuts - earth pea; (9.) vetch - common vetch (Vicia sativa); (10.) lupins (lupines); and (11.) minor pulses, including: Lablab, Jack bean, Winged bean, Velvet bean and Yam bean. Green beans and green peas are legumes but not considered pulses; consumed green, they are classified as vegetables. Soybeans and peanuts and other oil-rich crops are likewise excluded from the pulses. In Belize our culinary pulse of choice is red kidney and for export production the black-eyed pea.

All pulses are legumes, but not all legumes are pulses. Legumes have root nodules containing Rhizobia bacteria which trap nitrogen gas in air found in the soil and transfer it into a form of nitrogen which plants can use. This ability to 'fix nitrogen' allows them not only to partially self-fertilize themselves from the atmosphere, but also leaves an enriched soil which can improve the quality and quantity especially of subsequent cereal crops.

Some agronomists claim that pulses utilize less fuel resources than grain crops. Undisputed is the fact that producing pulse protein costs far less than producing meat protein.

Known to thrive in semi-arid climates with only 10-12 inches of rain per year, pulse cultivation in drier parts of Western Canada and in the U.S. states of Montana and the Dakotas has expanded almost 10-fold since 1998. Water consumption is a growing concern worldwide, in production of all goods including crops and processed foods. Pulses are extremely water efficient. The American Pulse Association estimates the following amounts of water to produce these foods:

Beef – 1,857 gallons/lb (note: this would be for grain-fattened beef)

Pork – 756 gallons/lb

Chicken – 469 gallons/lb

Peanuts – 368 gallons/lb

Soybeans – 216 gallons/lb

Pulses – 43 gallons/lb

India is the world's leader both in production and consumption of pulses. Production there is approximately 16 million metric tons, while to meet the recommended dietary needs would require 22 million metric tons. India has been importing roughly 3 million metric tons per year recently and in 2008 India outlawed export of all pulses. Global pulse sales are 60 million tons. China is also a heavy pulse consumer, importing large amounts of yellow peas for use in vermicelli noodles. China's purchase of that and other pulses grows steadily but changes often as to which pulse is purchased, reflecting fluctuating market prices.

Pulses can be fractionated into protein, fiber and starch. Pulse boasts a high digestible protein, which averages 20-25%. Pulses however lack much of the essential amino acid methionine. Grains, such as wheat, which lack lysine combine with pulses to create a complete protein diet. Indian foods commonly use sesame seed, a high source of methionine which augments pulse's protein, to meet complete protein needs.

Pulse have both soluble and insoluble fiber, which promotes a full feeling that is useful in weight loss diets and products. One cup of cooked lentils or dry peas contains about half of the daily adult fiber recommendation. Although the percentage of pulses which is fractionalized into protein, fiber and starch at this time is minimal, analysts expect this to drastically increase as researchers identify and invent new uses for pulse components. Expect to find lentils or another pulse on your list of food product ingredients more often in the future. Chickpea might be the most common pulse flour but lentil flours have recently been incorporated into Barilla's pasta. With lentil added to wheat pasta, total protein is increased, resulting in a complete amino acid food. Cooks will find the texture improved with an enhanced firmness which is less likely to become mushy when overcooked. Pulse starches are used to modify food textures of processed foods. Replacing fats with pulse starches are said to mimic the 'mouth feel' of fats; replacing eggs with pea proteins reduces cholesterol and makes the food product less allergenic as eggs have become the 4th largest food cause of allergic reactions. Pulse starches are also gluten-free, another bonus. Pulses have a high glycemic index, helping to level blood glucose after eating. Nutritionists advise that a diet rich in pulses is good preventative medicine. Pulses are rich in minerals, especially iron, magnesium, phosphorous, and manganese. B vitamins, notably folates, which are recognized as crucial in pre-natal diets, can be sourced from the humble pulse too. The Seven Countries Study showed a strong correlation between reduced coronary health mortality and legume consumption.

Not limited to human consumption, many pulses also wind up as animal feed.

"A man always has two reasons for doing anything - a good reason and the real reason."

Attributed to J.P. Morgan

Belizeans Learn Beekeeping and Honey Production

By Dottie Feucht

"Make sure there's **no** excess moisture, either from premature harvest, rainy weather, high humidity, or condensation, in your honey or it will be susceptible to fermentation," was one emphasis of the class on beekeeping and honey production at the education center of *Bridge the Gap Ministries*, located near Black Man Eddy. The class was conducted by professional beekeeper and honey producer from North Dakota, Alan King, on 6 consecutive Saturdays during January and February 2013. His lectures were simultaneously translated into Spanish and Chinese for the few students who did not readily understand English.

Honey, which is about 80% water when it is brought to the hive as nectar, is hygroscopic. That means it readily absorbs moisture. Anything above 18.5 percent is considered excessive and could result in the honey fermenting and spoiling. (See Rubber Boots question/answer of Belize Ag Report, Issue 17.) In Belize, extracting honey even in the driest months, usually March and April, requires careful attention to monitoring moisture. Alan stressed that the containers of extracted honey need to be capped with a tight-fitting lid. Large commercial honey producers watch their hives and test the honey that is extracted for moisture using a refractometer. As part of their natural process, bees cap the honey in the comb with wax at the right level of moisture. Extraction can begin after all the comb cells have been capped in the multiple frames of each box, called a *super,* that contains the bees and the frames.

The best method of producing liquid honey requires an extractor to whirl the honey from the uncapped comb/frame by centrifugal force. The job of uncapping is done with a sharp, heated knife to melt and slice off the wax cappings covering the cells on each side of the comb. After being uncapped, the frame containing the comb is placed in an extractor that uses centrifugal force to throw the honey out of the cells and onto the side of the extractor. The honey runs to the bottom of the tank where it can be drained. Combs are extracted on one side, and then lifted and reversed to complete the job. Reversible extractors have baskets that pivot to extract either side of a comb without lifting it.

Another emphasis of the honey handling presentation was cleanliness. Preparing a food substance for sale means careful attention to make sure that staff workers, utensils, and containers are not contaminated with any foreign matter. If an extractor is not properly cleaned after use, honey granulates on it and seeds more granulation when the extractor is used for fresh honey. "Granulated honey should be liquefied before marketing," warned Alan. Honey supers must be stacked, and sealed for storage with moth crystals in the top super to keep out wax moths, and then aired out for a week the next season before returning them to the bee hives.

The beekeeping classes started with instruction on establishing bee colonies and included monitoring and managing bee colonies in terms of the functions of bees and how they live and interact. There are three types of bees: queens and workers, which are female, and drones, which are male. Beekeepers must monitor their hives to ensure that each is "queenright". Queens are created by worker bees feeding a larva only royal jelly throughout its development, rather than switching from royal jelly to pollen once the larva grows past a certain size. Queens are produced in oversized cells and develop in only 16 days. Once mated, queens may lay up to 2,000 eggs per day. Beekeepers install new queens on frames of brood and bees taken from the stronger colonies to start new colonies. Workers, which develop in 21 days, are aptly named; their duties change upon the age of the bee in the following order (beginning with cleaning out their own cell after chewing through their capped brood cell): feed brood; receive nectar; clean hive; guard the colony; and forage. A typical colony may contain as many as 60,000 worker bees. Drones do not contribute to the honey-making task; their main function is to mate with virgin queens, after which they die. They also have no stingers.

Most of the bees in Belize are Africanized bees which are hybrids between European stock and one of the African subspecies, *A. m. scutellata*; they are often more aggressive than European bees, but believed to be more resistant to disease and better foragers. Originating in Brazil as a result of a breeding experiment for which the African bees were brought to Brazil in the first place, the bees have high resilience to tropical conditions and good yields.

The students of the beekeeping class had hands-on opportunity to practice the rudiments of monitoring the honey-making process by the bees and maintaining the hives. Donning beekeeping protective clothing the class learned how to use a smoker (fueled with dry cohune nut hulls) to calm the bees so they could take the cover off the super and examine the frames for honey-making progress and colony population.

The last class of the beekeeping course was a three hour documentary of Kings' commercial beekeeping and honey-producing operation in ND where Alan and his wife JoAnne have been earning their living at beekeeping for the past 25 years.

The Effects of Corporate Funding for Agricultural Research

By Michael Brubeck

The role of corporate funding of agricultural research at land grant universities, of which there are more than 100 currently in the US, is creating incentives for bias in independent university research. You hear again and again Congress and regulators clamoring for science-based rules, policies, and regulations. So if the rules and regulations and policies are based on science that is industry-biased, then the fallout goes beyond academic articles. It really trickles down to farmer livelihoods and consumer choice. A recent report found that nearly one quarter of research funding at land grant universities now comes from corporations, compared to less than 15 percent from the USDA. Although corporate funding of research surpassed USDA funding at these universities in the mid-1990s, the gap is now larger than ever. What's more, a broader look at all corporate agricultural research, $7.4 billion in 2006, dwarfs the mere $5.7 billion in all public funding of agricultural research spent the same year. Influence does not end with research funding, however.

In 2005, nearly one third of agricultural scientists reported consulting for private industry. Corporations endow professorships and donate money to universities in return for having buildings, labs, and wings named for them. Purdue University's Department of Nutrition Science blatantly offers corporate affiliates "corporate visibility with students and faculty" and "commitment by faculty and administration to address [corporate] members' needs," in return for the $6,000 each corporate affiliate pays annually. In perhaps the most egregious cases, corporate boards and college leadership overlap. In 2009, South Dakota State's president, for example, joined the board of directors of Monsanto, where he earns six figures each year. This appears to be a conflict of interest at face value; however let's not jump to conclusions about the integrity of an individual without factual basis.

What is the impact of the flood of corporate cash? We know from a number of meta-analyses, that corporate funding leads to results that are favorable to the corporate funder. For example, one peer-reviewed study found that corporate-funded nutrition research on soft drinks, juice, and milk were four to eight times more likely to reach conclusions in line with the sponsors' interests. And when a scrupulous scientist publishes research that is unfavorable to the study's funder, he or she should be prepared to look for a new source of funding. That's what happened to a team of researchers at University of Illinois who were funded by a statewide fertilizer "checkoff" after they published a finding that nitrogen fertilizer depletes organic matter in the soil. Checkoffs are a common method used to market agricultural products, and they are funded by a small amount from each sale of a product – in this case, fertilizer.

Will Allen writes about this period in his book *The War on Bugs*, telling the story of Justus Von Liebig, a prominent agricultural chemist in Germany. The "unholy trinity" of industry, government, and academics promoting industrial agriculture and de-emphasizing or dismissing sustainable methods has a long history and it continues today. But government is hardly immune from serving the corporate agenda either. Take, for example, Roger Beachy, the former head of the National Institute of Food and Agriculture (NIFA), the agency in the USDA that doles out research grants. Beachy spent much of his career as an academic, collaborating with Monsanto to produce the world's first genetically engineered tomato. He later became the founding president of the Donald Danforth Plant Science Center, Monsanto's non-profit arm, before President Obama appointed him to lead NIFA.

Policy is often based on research, but **good policy requires a basis in unbiased, objective research**. In a system in which corporations and government both fund research, but due to the revolving door of employment, the same people switch between positions within industry, lobbying for industry, and within government, what is the solution?

Editor's Note: *Michael Brubeck's work in the pharmaceutical biotechnology field has drawn him to recently relocate from his native San Francisco to Cayo District.*

Coconuts....Continued from pg 17

planted as "resistant" replacements. Rapid spread of the disease down the western Caribbean seaboard, and more recently to theWindward Islands (St. Kitts-Nevis and Antigua), demonstrates the danger to the regional industry.

Central Farm conducts its breeding program for *Maypan* on 25 acres. Program objectives center on supplying quality coconut plants to the public, and on training farmers and extension officers in coconut breeding and production technologies. Hybrids are hand pollinated from Yellow Dwarf onto the Tall. Once propagated, the seeds of the hybrid, *Maypan*, propagate faithfully.

Some significant characteristics of the *Maypan* hybrid:

- Highly tolerant to the Lethal Yellowing disease
- Is hardier than the Yellow Malayan Dwarf
- Starts bearing at four years after planting
- Yields about 120 nuts per palm/year with proper management
- Can withstand about one month of flood and about two months of dry conditions

Central Farm has extensive information on farming coconuts. The suggested density of planting is 70 to 80 plants per acre depending on whether a triangular or square spacing system is used. Seedlings should be planted on a line north to south direction so that the plants receive optimum sunlight. Plant from June to December when there is adequate moisture in the soil. Dig holes 18 inches deep by 18 inches wide. Place on the bottom of the holes discarded husk or organic material. Fertilize plants two times per year, June & December. Place the fertilizer in a circular band and cover with soil or sawdust. Don't prune the leaves of the plant.

News travels rapidly in our country of Belize. The 2012 inventory of seedlings for sale, exceeding 10,000 plants, has been sold out according to David Nabet, Tree Specialist at Central Farm Nursery. There are currently large standing orders for June 2013 production. Pricing to the general public has been $5 for bare root and $8 for bagged. Farmers interested in planting large acreage, kindly feel free to call Manual Trujillo at Central Farm for purchasing information at 666-6492 or email to trujilloman@yahoo.com. Please reference "purchase Maypan coconut" in the subject line. For further information, visit the MNRA exhibit at the Agricultural Show at the National Fairgrounds this year, May 3 through 5 where coconut production technology will be featured.

As we go to press, the Ministry of Natural Resources and Agriculture (MNRA) has announced that the EU is funding, through Europe Aid, a needs assessment study to identify opportunities for the development of the coconut industry in some CARIFORUM states. The selected CARIFORUM member states are Belize, Dominican Republic, Dominica, St. Lucia, Guyana, Jamaica, Suriname and Trinidad & Tobago.

The period of this study is January through May 2013. The consultants visiting Belize are Dr. Ranjit H. Singh, team leader and agricultural economist, and Dr. Simon Edon-Green, plant health specialist. Minister of Agriculture has appointed Manual Trujillo, National Crop Coordinator, as the focal point for Belize for the EU Coconut Project. The aim of the study is to identify specific project interventions and the accompanying measures aimed at boosting productivity, profitability and competitiveness of the industry in the Caribbean region.

Belize Grain Growers ...Continued from pg 5

biscuits, chocolate, sweets and other confectionary that are made with refined sugar would have to end as most refined sugars are produced from GMO sugar beet and High Fructose Corn Syrup (HFCS) produced from GMO corn. We would have to drop the eating of all cheese as almost all cheeses are produced using GMO manufactured rennin tablets. We would have to stop eating corn flakes and the numerous GMO produced cereals on the markets, and all corn tortillas that has Mexican or Guatemalan minsa would have to end as the Maseca company that produces imported minsa cannot guarantee that its minsa does not contain GM corn.

With over three (3) trillion meals eaten by humans in over a decade and a half, there has never been a single substantiated case of GM food causing harm to us. In fact, during this 15 year period in Belize, all our chickens, pigs, many cattle, dogs (man's best friend), and all of us are eating GMO foods. So armed with this knowledge, is it safe to conclude that it not the use of aluminium pots, mercury in our water, microwave, cell phones, pollution, lack of exercise, processed foods, too much carbohydrates or too much sugar, but rather GMOs in general, that we should blame for all health challenges that we face as a nation.

The position of science on GM technology and GM crops is well established and gives us little to worry about from GMOs regarding food safety. With the Canadian Food Inspection Agency (CFIA), the US Food and Drug Administration (FDA), the European Food Safety Agency (EFSA), Brazil's Food Safety Agency (EFSA) and Russian Food Safety Agency, all giving food safety clearance to numerous GMO products and many GMO crop varieties, it makes practical sense for Belize to review the work done by these agencies, and avoid the temptation of setting up an overly bureaucratic, expensive and unaffordable clearance system for GMOs.

The better question to ask is **"For which crop, with what modification, and for what purpose?"** In Belize we should assess GMO crops on a case by case basis, and a general attack on GM technology is simply an anti-science attempt to stimulate fear. To say that GMOs is what is causing diabetes in Belize is not rational thinking, especially when, on the contrary, GMO produced insulin is widely used to help and extend the life of diabetics.

Belizeans – let's be rational in our thinking and not be misled. As Mark Lynas said, "You are more likely to get hit by an asteroid than get hurt by GM food".

Editor's note: The Belize Ag Report acknowledges and respects the need for dialogue among the agricultural community. Publication of a letter or an article does not indicate endorsement by The Belize Ag Report of the views and content therein.

The Bias Against GMO

By John Carr

When we humans hold a bias concerning a certain issue, that bias can be regarded as truth by us and, we think, should become law. Another person may be of an exact opposite bias, also regarding it as truth. In other words, the owner of the bias says "There are two truths – only mine is really true and your truth is false". One subject of bias these days concerns firearm controls – particularly in the US, but also in Belize.

Simply put, a large percentage of murders happen in Belize by using knives, machetes and clubs. How can we eliminate all guns, knives, machetes and clubs? (Impossible) When the evil enemy makes me or you or my home or your home a mark, probably an equal or superior weapon gives us a chance or dissuades the evil one from coming into our presence. The evil one can get a weapon from theft, an underground store or a neighbouring country and "that's no maybe ". We probably won't go that route and the law makes it very difficult to keep a gun in our home or on our person. All of this adds up to Unfair – Unfair. All of this is the result of a bias that became law.

When we have a bias, we search for evidence for support. We may hunt for a scientific statement that proves GMO to be harmful. (There is plenty of supporting information). Then we will ignore the implementing health and safety agencies of forty some governments where GMO producers make up to 85- 95% of the crops grown in that country. The agriculture producers in Australia, Argentina, Brazil, Honduras, United States and Canada – to name a few, mostly use GMO technology. Corn is only one of the many food products that use GMO science.

There are dozens of products on our Belizean grocery shelves that say "Made in the USA and contains corn and soy bean ingredients (which are most likely to be GMO)". When a country takes on the validity of GMO it is usually to increase yields and in the case of Belizean GMO corn it would increase exports. It also would allow the Belizean farmer to use a greatly reduced amount of real poisons that he uses to kill pests and weeds. The question is, "Which truth will win?"

Stressed Vegetables

By Mitylene Bailey

It happens to all of us: the home gardeners and the mass producers. We forget to water our leafy greens or the day is particularly hot and our veggies start to wilt just a bit. A few minutes after irrigation they return to their leafy glory. Later, at harvest time the plants appear to be physically unaffected except for a few lost leaves, no significant change in flavors. No harm done, right? Wrong. We were taught that and plenty of water and sunshine encouraged by a sprinkle or two of our favorite fertilizer is essential to plant growth; but sometimes too much sunshine and just enough water needed to keep the plant alive can cause a series of events resulting in the plant producing high levels of substances which may damage our health in the long run. Research funded by ICDF conducted on Chinese kale revealed fascinating results which could cause one to rethink the nutrition content of his or her favorite green-leafy once it has been subjected to stress—water stress.

Water is especially important to plants since it helps to dissolve the essential nutrients in the soil and act as a vehicle to transfer these nutrients into and throughout the plant and then shuttle any waste out. Water also combines with the energy of sunlight and nutrients from the soil in the process of photosynthesis to make the starches, sugars and proteins. These photosynthates produced by plants provide food for the plant itself as well as humans and any other animal that consume it. Plants can survive short term periods of reduced water availability which they can quickly recuperate from but this is a delicate balance that can quickly lead to permanent wilting if it is prolonged.

Useful nutrient-rich material, drawn up by the roots with that aid of water such as nitrates, are found in soil or fed as fertilizer and are directly involved in the manufacture of proteins. This material is stored in the plant storage unit called a vacuole until it is needed. Inside the vacuole, nitrates have an additional function of keeping the water balance in the cell and leaf. When plants are subjected to water stress or drought period, an enzyme called abscisic acid (ABA) draws the nitrate out of the vacuole; water in turn follows the nitrates out of the vacuole and supplies the plant cells with water for just a few hours. When water supply is replenished more nitrates are taken up from the soil along with water and is taken to the vacuole. If this event continues to repeat, nitrates eventually accumulate in the leaf of the plant. In leafy vegetable production this type of water stress event may occur multiple times before the vegetable is harvested. Most growers do not concern themselves with possible nutrient compromise, a seemingly harmless "dry day" here and there may cause.

The long term effect of accumulated nitrates in leafy vegetables is not known since they are harvested within a month of planting but long term effects on humans consuming nitrate-rich vegetables is less than favorable. It is indeed a fact that nitrates are important to human health since it is critical in many important biological reactions in the body. Nitrates in excess, though, can react with substances in our body to form cancer-causing agents, something, we have been told, that eating lots of leafy greens is supposed to avoid. How then can we be sure that we are getting non-affected produce when we grow them at home or purchase them at the market? Home gardeners: water normally in the mornings or late evenings but generously during the hotter times of the day, particularly around noon. Contrary to popular folklore you will not "shock" the plants. Leafy-greens, just like us, need more water on hotter, drier days too. Market buyers: avoid vegetables with wilted, yellowing or damaged leaves. Also, be careful of vegetables that look over-trimmed and undersized. Don't be afraid to talk to the seller, ask questions and make suggestions.

Taste buds aside, we all want the best on our plates and in our bellies. Most of us interpret that as eating more greens. As we mature we realize the importance of healthy eating and we attempt to make the best choices to improve health and quality of life. Learning more about the foods we eat can give us the power to do this. So, go ahead! Eat those leafy greens; just make sure that they are not thirsty, stressed vegetables.

Energetic Agriculture ...Continued from pg 6

Adverse Effects of Salt

Many traditional mainline academicians argue that plants don't need sophisticated materials like proteins, amino acids, or vitamins because the plants are able to synthesize these substances for themselves. If they are available, this is true, but the rescue chemicals and salt fertilizers kill the microbes, rendering the soil dead. It becomes a wasteland, just as how Rome salted the agricultural fields of ancient Carthage thus destroying a competitor. A good example of this salting is potassium 0-0-60, or by its chemical name – Muriate of Potash (MOP) or (KCI – Potassium Chloride). It's a cheap by-product of making nitric acid. In agriculture it is the most common source of potassium - some 95% of all potash used worldwide. Its composition is potassium = 50% and chloride = 46%.

According to some land-grant university academicians, the chloride is no problem because it will either leach from the soil into the ground and/or ground-water or become chlorine gas and escape into the air. This statement does not correspond to the science of chemistry. The major components of air are: H_2O with molecular weight (mw) of 18; CO_2, mw 44; N_2, mw 28; and O_2, mw 32. The molecular weight of chlorine gas is 70. Thus because it is heavy, it remains close to the surface of the ground. The most chloride a soil for farming can tolerate is 140 lbs/acre. If a farmer adds 200 lbs of MOP per season (which is normal), he or she is adding some 110.4 lbs/acre of chloride. In Belize we usually grow two crops per year; so the farmer adds some 220.8 pounds per acre of chloride each year, which is 80.8 pounds per acre of chloride above the minimum in the first year. If a human takes five tablespoons of salt at once, he or she will die. This was how the ancient Chinese committed suicide.

The Balance of Potassium and Calcium

Excessive use of potassium fertilizer causes potassium to replace calcium and can launch plant diseases. The farmer then adds more potassium to fix the problem, but makes the situation worse. Potassium is essential for growth, but it is easy to use too much. It is mostly soluble in soils. Calcium is usually insoluble in soils. As Einstein said, "God does not play dice". God is perfect. Nature which is God's handiwork has created microorganisms in the soil to regulate the ratios of calcium to potassium. But when our chemicals such as MOP fertilizer, anhydrous ammonia fertilizer or herbicides and/or insecticides kill-off those microorganisms in the soil, we set ourselves up for horrible consequences. When plants cannot get enough calcium, they substitute potassium, but too much potassium causes severe health problems in animals and humans who eat those damaged crops.

The potassium-calcium imbalance in feed crops causes cows to get bad kidneys, and hogs to develop arthritis, and when humans consume broccoli, spinach, or lettuce produced by the potassium-calcium imbalance they can develop kidney and heart problems. Least we forgot, the water company uses only two parts per million (2 ppm) of chloride to destroy bacteria; so when a farmer puts an excess of over 40 ppm on the soil and keeps doing so year after year he kills every living thing in the soil. That's why the farmer needs rescue chemicals, and why year after year his yields drop unless he adds more chemicals and the insects' population grows more abundant.

In the United States after practicing this foolishness for 50 years, the chemical companies developed the ultimate rescue chemical – genetically modify (GM) crops resistant to specific chemicals, which today are causing the death of a farmer every 30 minutes, in India alone, according to their government records. A GM-related crisis is also developing in Belize. Every year we eat over 8.5 million chickens and over 20,000 heads of pig. For the last fourteen years or so we have been importing GM soy meal from the United States to feed our chickens and pigs and all types of packaged foods containing GM corn and GM soy. But over the last ten years, Belize has seen a dramatic increase in degenerative diseases such as cancer, auto-immune, diabetes, and heart problems, etc. When we Belizeans consume excessive sugar, and combine it with packaged foods, GM soy meal, and dangerous vegetable oils and margarine is there any wonder why we, as a nation, are so sick?

Growing Crops Without Rescue Chemicals

To grow commercial vegetables, corn with yields of 7,000 pounds per acre, or soybeans of 2,600 pounds per acre without rescue chemicals is not impossible, but also not easy. Many farm soils need to be re-mineralized which usually takes a couple years after excessive use of salt chemicals. Having studied Reams, Callahan and Albrecht books and experimented with their soil concepts I have found that if the energy of the soil is adequate and balanced, there are no insect, or weed pressures and the yield is high with nutrient-dense foods. I have grown field corn and sweet corn with food-grade fertilizers (no muriate of potash) and NO rescue chemicals. I got rid of the ear worms without using any insecticides simply by changing the mix of fertilizers to obtain the necessary energy. Ear and earth worms love corn, especially sweet corn in Belize and usually destroy most crops. They can be destroyed without rescue chemicals and without GM seeds in Belize.

For healthy soils, farmers should use only food-grade fertilizers, both organic and inorganic, especially compost and **not** salt fertilizers. Human blood, ocean water, pigs and plants all have one thing in common: they all need at least eighty elements of the periodic table to promote good health. God's world was made perfect. More than seventy years ago, Dr. Albrecht in one of his lectures said: *"(The farmers) fail to see that immune plants are those getting enough soil fertility support for creating their own protective proteins or antibiotics in the same way as fungi make theirs to protect themselves from each other and to protect us similarly when we take their antibiotics into our blood stream."*

For many years our chemical agriculture teachers promoted only three elements: NPK. Now a few brave agronomists are promoting an additional eight elements such as zinc, iron, copper, manganese. But the "prince" of soils – calcium has been neglected. And instead of operating by the seat-of-his-pants, the farmer should get a LaMotte soil test to determine the requirements to re-mineralize his soil with the missing elements, correct the ratio of calcium to magnesium to stop compaction and create a loose soil (oxygen in the soil).

A Holistic Approach

A holistic approach of chemistry and biology with physics as the bridge is needed to achieve success: high yielding nutrient-dense foods for good health of both animals and humans. Let's look a little bit more at insects such as the corn ear moth that has recently devastated the corn fields in Little Belize in the Corozal District. At death, all living creatures go through several stages of decomposition until they "return to dust", as the bible states. As decomposition sets-in, fermentation causes ethanol and ammonia to be produced which is the attractive state that brings hoards of nature's garbage scavengers, disease and insects to feed. Prof. Phil Callahan has written that when he was studying under Prof. Reginald Painter of Kansas State for his PhD. his job was to discover why certain plants were resistant to disease and insects. After forty years he *"discovered that unhealthy plants from "sick," poison-fed, soil give off slightly higher ethanol and ammonia infrared signals than healthy plants."*

Modern farms have extended the use of urea fertilizer, which

Continued on pg 25

Energetic Agriculture ...Continued from pg 24

is an ammonia source of nitrogen. One of Prof. Callahan's many discoveries was that insects communicate by infrared radiation which their magnetic antennae or sensilla use to focus and concentrate the signals. Nitrogen is needed for plant growth, but it is in two forms – nitrate and ammonia which are cations and anions – Yin and Yang – plus and minus -- e***nergy***. Therefore, when farmers use too much urea on their fields they are attracting the insects to come and feed, because the insects are attracted to the stronger ammonia frequency. Nitrate and ammonia nitrogen must be balanced with calcium, magnesium, potassium, phosphates, sulfur, and the other seventy-three elements for healthy soils. In other words, fix the soil and plant diseases and insects disappear; in addition, our human degenerative diseases also disappear.

A Focus on Belize

Reams "*Biological Theory of Ionization*" may not fit the school texts, **but it works**. I care not for the fanciful academicians; my interest is what will give a high standard of living to our people with joyful, happy citizens of good health as the result of our endeavors. Along that line, two fertilizers should be banned in Belize because of the damage they have and are causing – muriate of potash and anhydrous ammonia (82% N); likewise, GM seeds must never be allowed in Belize, because of the health, legal, and environmental issues. And worst of all, GM does not work for long; American farmers know about the super weeds created by GM crops, so much so that Monsanto is trying to gain approval for the very dangerous 2,4D chemical for weed control as "Roundup Ready" has failed. Plus the Bt in corn have recently failed as a pest control for Bt corn whose resistance to the fall army worms has been established by Louisiana State University entomologist Fangneng Huang (http://deltafarmpress.com/corn/armyworm-resistance-bt-corn-lsu-research). It's best to quote Dr. Robert van den Bosh of University of California, Berkeley:*"You can't beat insects with insecticides [or GMO] and we are only fooling ourseleves if we think we can. They are too adaptable. They have tremendous genetic plasticity. They are prolific as **** and they are mobile."*

bilindo2001@gmail.com

Linking the Caribbean

By Shamin Renwick

Conferences/Meetings

30TH West Indies Agricultural Conference (held jointly with the Caribbean Food Crops Society (CFCS)and the International Society of Horticultural Science (ISHS) -30th June–6th July, 2013

See info on call for papers and registration on: http://www.caestt.com

Caribbean Week of Agriculture
This annual event is held in a different Caribbean country every year around October/November.
http://www.caribbeanweekofagriculture.ag

Agricultural Associations

Caribbean Food Crops Society (CFCS)
http://cfcs.eea.uprm.edu
Caribbean Agro-Economic Society
http://www.caestt.com
Caribbean Farmers Network (CaFAN)
http://www.caribbeanfarmers.org

Institutions

Caribbean Agricultural Research and Development Institute (CARDI)
http://www.cardi.org
Inter –American Institute for Cooperation on Agriculture (IICA)
http://www.iica.int/Eng/Pages/default.aspx

FAO Regional Office for Latin America and the Caribbean
http://www.rlc.fao.org/en
Caribbean Food and Nutrition Institute
http://new.paho.org/cfni/
Caribbean Community Climate Change Centre
http://www.caribbeanclimate.bz/

Trade Info

Agri Trade
http://agritrade.cta.int/Agriculture/Topics/EPAs/Caribbean-Agricultural-trade-policy-debates-and-developments
Caribbean Basin Agricultural Trade Office
http://www.cbato.fas.usda.gov

Directory

Directory of Caribbean Agricultural Information Sources 2012
http://www.uwispace.sta.uwi.edu/dspace/handle/2139/11547

Social Media

Blogs

Caribbean Librarians for Agriculture
http://caribbeanlibrariansforagriculture.blogspot.com

Life of plant blog
http://lifeofplant.blogspot.com/2011/10/caribbean-agriculture.html

shamin.renwick@sta.uwi.edu

Dear Editor,

This letter urges Belizeans to educate themselves regarding the threat posed by the introduction of GMOs. Farmers, subsistence and commercial, must examine the issue and draw their own conclusions regarding the viability and safety of GMOs to understand what truly is at stake.

Scores of scientists provide detailed evidence linking GMOs and many health issues, including cancer and degenerative diseases, super viruses and interior toxins. Eating GMO food products has been directly linked to autism, diabetes, inflammatory diseases, heart disease, birth defects and recorded deaths.

Dr. Richard Lacey, Professor of Medical Microbiology at the University of Leeds, states: "It is my considered judgment that employing the process of recombinant DNA technology (genetic engineering) in producing new plant varieties entails a set of risks to the health of the consumer that are not ordinarily presented by traditional breeding techniques. It is also my considered judgment that food products derived from such genetically engineered organisms are not generally recognized as safe on the basis of scientific procedures within the community of experts qualified to assess their safety."

Dr. Mae-Wan Ho, a respected British scientist and fellow of the US National Genetics Foundation., describes the large-scale release of transgenic organisms as "much worse than nuclear weapons as a means of mass destruction..." in her book, *Genetic Engineering: Dream or Nightmare?*

The overwhelming consensus of the scientific community is that GMOs pose a very serious threat to our health, our food security and the biological integrity of the natural world. Food, clean water and clean air, are fundamental to our survival and must not be compromised for any reason, least of all for economic gain.

The introduction of GMOs into Belize is nothing less than a Trojan horse! Belize can and must protect its citizens, future generations and the environment by joining the 27 countries around the globe that have banned GMOs. Demand it!

Christine McIntyre

Author/Artist/Publisher, Citizen of Belize

ATTENTION HORSE OWNERS!

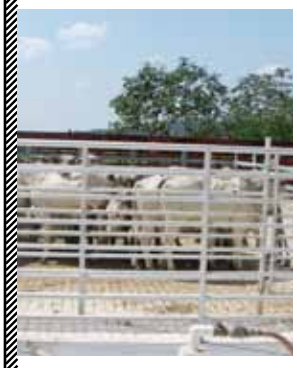
BAHA confirms an outbreak of the Venezuelan strain of Equine Encephalomyelitis in Cayo and Corozal Districts. All horse owners are urged to vaccinate their horses.

Local and Regional Fuel Prices

	Cayo, Belize	Quintana Roo, Mexico	Peten, Guatemala
REGULAR	↑$11.58 Bz/Gal	↑ $7.14 Bz/Gal	✻$10.14 Bz/Gal
PREMIUM	↑$12.04 Bz/Gal	↑ $7.50 Bz/Gal	↑$10.68 Bz/Gal
DIESEL	↑$11.42 Bz/Gal	↑ $7.37 Bz/Gal	↑ $9.86 Bz/Gal

✻Unchanged

HURRAH for the FIRST LEGAL EXPORT of CATTLE



Belizean ranchers had grown weary waiting for the first legal export of cattle to Mexico, but it finally happened on February 25, 2013. Forty-four heavy weight steers, assembled in a certified shipping corral in Blue Creek, Orange Walk District were loaded into a waiting Mexican truck. The double deck transport was sealed by sanitary officials and began the journey to a slaughter facility in Villa Hermosa, Tabasco, Mexico. Belize cattle prices are at an all-time high.

The Belize Ag Report, P.O. Box 150, San Ignacio, Cayo District, Belize, Central America

Telephones: 663-6777 ***(please, no text, no voicemail)***

Editor & Publisher: Beth Gould Roberson

Assistant Editor: John Carr

Special Editor: Dottie Feucht

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