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Tropical Agro-Forestry -- A Belize Bamboo Project

by Marc Ellenby and Brooks Parrish

Bamboos are very well adapted to Belize growing conditions. These elegant plants thrive in many soils and bring a tropical look to any landscape. Over the years, we have introduced many varieties of useful and beautiful tropical clumping bamboos to our farm on tranquil Spanish Creek in the Belize District. This article is a summary of our progress to date.

Our bamboo agro-forestry project began in January, 2005 when we purchased a second growth forested property of 1978 acres. Tropical Agro-Forestry, Ltd. was formed and we began to study our site. At the recommendation of the Belize Forestry Department, we started to work with the Belize Agricultural Health Authority (BAHA). BAHA officials began a pest risk analysis (PRA) to verify that the introduction of bamboo would pose no risk to other crops in Belize. After a year of research and site visit to south Florida to view bamboo plants there, the protocol for the importation of bamboo into Belize was developed. Bamboo plants from cuttings were started in our nursery in grow bags of native soil amended with rice hulls and compost. We planted our nursery starts in the field later that year on 50 acres on the forest edge. Our varieties are clumping types of *Bambusa* and *Dendrocalamus* species. We are currently introducing new and exciting varieties from south Florida. In a few years, we will also have young nursery plants available for sale or trade.

Tropical clumping bamboos are remarkably fast growing plants. Bamboo shoots grow fatter and taller each year on the outside of the clump. Because the shoots are attached to the large rhizome, they may grow up to one foot each day when it’s raining. Mature plants continue to shoot each rainy season. Many of the varieties have shoots that are edible when young.

Bamboo annually produces multiple canes making them a truly sustainable and renewable farm harvest product. Our bamboos are harvested on the waning full moon in the dry season and are then treated with boron submersion, an effective village-scale treatment to eliminate post-harvest pests. Interestingly, it is the older canes that are used in construction and crafts; the young and fresh canes are too sweet and full of starch and do not last long if used. So there is a careful selection process to insure that the proper canes are utilized. Bamboos are useful in crafts and artistic pieces, for musical instruments, woven baskets, furniture, household tools – and much more. In the landscape, this fast growing plant quickly provides shade from the tropical sun, and every day the canes are a source of useful material. Some bamboos are thin-walled for splitting and weaving, others have fat canes with a thick wall for construction, and others have black canes and the color is maintained after harvest. Each bamboo has a different look and unique feel. Our plan is to split the bamboo canes lengthwise so that we have a good supply of bamboo flats for lamination and many craft items. Smaller, thinner splits are being used to weave bamboo baskets. Custom furniture pieces are available – if you can dream it, we can build it!

Our craftsman, Tony Aguilar, is working full-time in the Tropical Agro-Forestry workshop designing bamboo crafts and furniture. Tony is a very talented artisan and takes pride in his work; his designs are both functional and artistic, as you may see in the photos here. We are always designing new bamboo furniture items and creative crafts. Local hardwood pieces are used along with our many bamboos; we can use short boards and wood scraps well in our designs.

Sustainability is first and foremost on our farm. We are developing our permaculture model. Rainwater catchments and solar energy power our small main house and many palapas. Our organic farm includes plantings of cassava, coco, callaloo, chaya, bananas, plantains and more.

Please visit our website www.BelizeAbility.com – Spanish Creek Rainforest Reserve -- and enjoy a nice video on our Home page to meet our crew. We are grateful for the support and love of our many Belizean friends and families.

Currently, we are in the process of developing our website specific to our bamboo products. Inquiries and orders will soon be received at the web address www.BelizeBamboo.com.

**Editor’s Note:** Marc Ellenby has been growing tropical fruits and tropical clumping bamboos in Florida since 1980. He is the owner of Spanish Creek Rainforest Reserve and Tropical Agro-Forestry, Ltd. in Belize. Tropical Agro-Forestry’s farm plan is to create a sustainable model for village scale production of bamboo and handicrafts.

Brooks Parrish manages Tropical Agro-Forestry, Ltd and Spanish Creek Rainforest Reserve since 2010. She enjoys fresh air and tranquil living.

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TO THE EDITOR... Continued from page 4

Now there are less than 400. To combat Greening, the industry has to do two things: give the trees heavy foliar fertilizers and control the disease vector, the Asian Citrus Psyllid. However, it is a pointless exercise if one farmer sprays for control and his neighbor does not. In addition, abandoned groves have to be sprayed. To do this control effectively, there has to be a national spray program, mandated by law. All have to do it if we are to save our industry.

Again on the legal side, Belize has to be prepared for the introduction of genetically modified (GMO) citrus trees. We need the Bio Safety Council to act and prepare for the introduction of these trees. Researchers have trials ongoing in Florida for over 5 years on citrus trees whose genes have been modified by the introduction of the gene of the spinach vegetable. They are completely resistant to the virus.

So will our government act and will citrus growers wake up? I hope so.

Frank Redmond
Palm Springs Farm
******************************************************************************

Dear Editor,

Featured in the full page ad supporting the use of genetically modified organism (GMO) seed that appeared in the Belize Ag Report, issue 27, paid for by the Belize Grain Growers Association (BAGA) was a statement that BAGA believes in addressing farmer’s problems with technology and not sentimental ideology -- trivializing concerns of anyone questioning this technology. We have all seen, read, and heard some very sophisticated and expensive ads created to convince us that GMO food seed is a good thing for the planet, despite the fact that many studies paint a different picture for this technology.

A recent European study revealed that GMO corn caused tumors in rats over a 2 year period versus a 90 day test period that Monsanto used. Though greatly criticized by Monsanto, the study has survived comprehensive and independent reviews.

For many who have researched the history of GMOs, it is obvious that this technology is an attempt by the big agrichemical companies to dominate the world’s food production. They do this by manipulating not only the genetics of nature’s perfect seed, but the population as well.

In the mid-seventies former US Secretary of State Henry Kissinger said, “Whoever controls the world’s food supply, will also control the people.” Twenty years later, the first commercial large-scale cultivation of GM plants began in the USA. Caution concerning the technology expressed by some of its own scientists was ignored by the US Food and Drug Administration (FDA), the organization charged with protecting public health and assuring the safety of the country’s food supply.

Over the next decade, lawsuits brought the truth to the surface. The FDA was forced to release 44,000 pages of documents that revealed government scientists’ references to the unintended negative effects. Over the protests of many agency scientists, these references were deleted from drafts of their policy statement. Documents also revealed that the FDA was under orders from “the White House” to promote GMO crops and that Michael Taylor, Monsanto’s former attorney and later its vice president, was brought into the FDA to supervise policy development.

Claims by pro-GMO ads that there is a consensus among scientists and governments that GMO foods are safe, are simply not true. There is no such consensus. In fact, many scientists and governments have found it “scientifically unjustifiable” to assume that GMO foods are safe without more rigorous scientific testing. Various bans exist on growing and/or importing GMO foods in many countries, including, but not limited to: Australia, Austria, Bulgaria, China, India, France, Germany, Greece, Hungary, Italy, Norway, Luxembourg, Poland, Romania, Switzerland, New Zealand, Mexico, Russia, Sweden, Thailand, Philippines, Saudi Arabia, Egypt, Algeria, Brazil, Peru and Paraguay.

In some places GMO technology has caused tragic situations where small farmers can no longer take seed perfected by nature and plant for new crops. Instead, they must buy expensive seed and chemicals from the agrichemical companies, causing many to give up farming and sell their land to the big ag companies cheaply. In India, thousands of suicides by small, once independent, farmers have been attributed to the introduction of GMO cotton and the debts the farmers incurred and could never repay.

Karin Westdyk
Voices for Safe Food and Energy
Voicesforsafeenergy@gmail.com
******************************************************************************

Dear Editor,

Question: Are Roundup ready crops and foods containing glyphosate as a result of this toxic chemical an ethical and moral issue?

Monsanto, who developed Roundup, has a history of political corruption and spreading dis-information* for profit. And those who continue to spread dis-information* are also guilty. They are willing to sacrifice their children for profit. (1Timothy 6:10) Scandals involving PCB’s, Agent Orange, bovine growth hormone, NutraSweet, IUD, genetically modified seeds and toxic herbicides are part of this dark history resulting in millions in lawsuit settlements.

Continued on page 42

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State-of-the-Art Citrus Nursery
By Thomas E. Tate, Nursery Manager for Plant World Nursery, CGA

Who we are...
Plant World Nursery was created to complement the existing nursery production capacity and ensure the availability of citrus plants in the quantity urgently required by the citrus industry to replant and replace uneconomic diseased trees, thereby lowering the Huanglongbing (HLB) inoculum in the industry.

Plant World Nursery is a state-of-the-art nursery facility located on the Red Bank Road off the Southern Highway. It consists of four greenhouses totaling 3.6 acres of covered space. There are three nursery structures of about 1 acre each for the production of clean (disease-free) nursery plants. The other structure, covering about 0.2 acre, is used for budwood production.

Plant World Nursery sits on 18 acres of land out of 100 acres available for nursery expansion or for the planting of fruit crops like citrus, soursop and pineapples that are processed at the citrus factory. In addition to direct support of the fruit juice industry, the nursery will also be able to produce other fruit trees for customers.

Threat to the Citrus Industry...
HLB disease commonly known as Citrus Greening was discovered in Belize by Citrus Research and Education Institute (CREI) in 2009, and has since spread to most of the citrus growing areas in Belize. HLB is one of the most devastating diseases of citrus affecting the flow of nutrients throughout the plant. The discovery of HLB disease has resulted in a transformation of the nursery industry in Belize. The Government of Belize passed legislation that made it mandatory to produce citrus plants under covered screenhouse structures. These nurseries are then certified by the Belize Agricultural Health Authority (BAHA) under the Belize Citrus Certification Program (BCCP). Open field nurseries were given a grace period to sell off their plants and restart nursery production in certified structures.

Our Technology...
Plant World Nursery employs the latest technologies with state-of-the-art equipment to produce the highest quality plants specifically for the growing conditions in Belize. Our open system approach allows customers to order whatever combinations of commercial plants they require based on fruit and rootstock variety. Currently we are able to produce trees on Sour orange, Cleopatra mandarin and Volkameriana lemon rootstock. However with sufficient notice any certified rootstocks can be ordered. The commercial varieties of Valencia orange, Marsh grapefruit and Tahiti limes and a limited number of other varieties are available on demand, but a total of 44 different citrus varieties are available and can supplied on demand within a six month period.

Plant World Nursery is the largest state-of-the-art citrus nursery between Florida and Brazil. Sharing the technology being employed and the ongoing research activities will serve to improve the quality of all nurseries in the industry. The proceeds of Plant World Nursery go to strengthening the services offered by CGA and CREI to all citrus growers.
Conquering the Silent Killer – The Pink Hibiscus MealyBug

Did you know that you could be harbouring thousands of pests in your backyard? And did you know that thousands if not millions of dollars can be lost because of it? The hibiscus plant serves as an aesthetic plant, decorating our beautiful yards, but at the same time serves as the perfect place for the silent killer to hide and survive.

Since its detection in 1999, the silent killer has been largely ignored. The pink hibiscus mealybug (Maconellicoccus hirsutus Green), as it is widely known, has unnoticeably established itself throughout the country causing significant challenges to plant growth during dry conditions, especially impacting agriculture’s stability and the livelihoods of many farmers.

Mealybug infestations appear on a large number of host plants as a tiny, soft bodied insect that looks like a mass of cotton. Mealybugs are sucking insects that feed on sap of young tissues on plants by introducing its mouth part called a stylet. Through its feeding mechanism, the mealybug introduces toxic saliva inside the system of the host plant causing significant visual symptoms such as curling leaves, deformed fruits and flowers and stunted growth.

The bug is known as a polyphagous pest throughout the tropical and subtropical regions and has caused extensive damage on trees, shrubs, fruits and vegetables around the world. Hibiscus plants of the Malvacea family are the primary host of preference for the PHMB in Belize. The mealy bug has the ability to feed on other species of plants, especially during the dry seasons when the population severely increases if minimal or no control is done. In high infestations mealybugs excrete a sticky substance known as honeydew which encourages the development of sooty mold fungus on leaves. Sooty mold is black in color and eventually covers leaves and stems. This mold inhibits infected portions of plants from photosynthesizing and causes aesthetic damage. Ants are highly attracted to the honeydew excreted by the mealybug which in exchange provides protection for the bug.

Female Anagyrus kamali

The life cycle of the oval shape female mealybug is completed in approximately 30-35 days. During its last stages of life, the female bug develops a white cocoon where 500-600 tiny pink eggs are deposited prior to hatching. After 3-4 days the eggs hatch into crawlers. At this stage, the nymph mealybugs can easily be spread by wind, animals or people and establish themselves elsewhere.

For its control the Regional Pink Hibiscus Mealybug Project operated by the International Regional Organization for Health in Agriculture (OIRSA) and the Belize Agricultural Health Authority (BAHA) are presently reproducing thousands of its biological control agents to be released in the fields to alleviate the levels of infestation. The project has been efficiently maintaining under control this alarming yet detrimental pest. The biological control organism is a tiny primary endo-parasitic wasp by the name of Anagyrus kamali Moursi. This parasitoid is known to be the most common and effective control agent of the pink hibiscus mealybug in Belize. It possesses a good searching capability; it is a specific controller for the PHMB and does not cause any negative effects to the environment or harm to people. At first these controllers were introduced in Belize from the Centre for Agricultural Bioscience (CABI) in 2000 for the purpose of maintaining under control the PHMB infestations in the fields. The female parasitoid measures 0.95-1.93 mm in length, as tiny as a tomato seed; this is the one responsible for parasitizing its target. The egg deposited inside the body of its host develops to a larva that feeds from the fluids inside the body of the mealybug and completes its cycles until it emerges from an exit hole as an adult A. kamali. During this process, the mealybug is paralyzed and dies and eventually become mummified. The mummy serves as shelter for the A. kamali to complete its metamorphosis.

Since its inauguration in 2003, the PHMB laboratory has steadily increased its reproduction of A. kamali to be released in the field or to be exported to El Salvador. For the year 2014, over 1.29 million parasitoids were reproduced of which 64% were released throughout the country of Belize, 21% exported to El Salvador and the remaining 15% used for rearing purposes at the laboratory.

The reproduction trend of the parasitoid has been increasing throughout the course of the years, whereas the effective and efficient control agent is being used for the control of the PHMB in Belize and the region. Effects will remain in place until the silent killers are completely under control.

For more information on the PHMB please contact OIRSA office at telephone: 802-3753 or 822-0521. Our e-mail address is esosa@oirsa.org.
Management of Soil Micro-organisms for Improving Organic Matter Levels in Belize

By Dr. Stephen Zitzer

Agricultural soils and undisturbed soils both consist of complex communities of living organisms. It would be foolish to lump all plowed fields and native soils together as just “plain dirt”. However, all soils do fundamentally rely on similar groups of soil bacteria and fungi to consume and break down living and dead organic matter and mineral rocks into small mobile chemical forms of most elements that they contain. Among these decomposition products are the 16 essential elements plants require for growth that are in forms most plant species are capable of absorbing through root, stem and/or leaf surfaces. Besides conducting these critical chemical transformations, the life and death of trillions upon trillions of soil bacteria and fungi result in the development of soil structure. Soil structure, or really development of interconnected internal pore spaces, provides the microscopic infrastructure or plumbing that allows soils to breathe, eat, drink and grow.

As soils age, a general measure of their growth is the amount of carbon they accumulate, most of it incorporated in living and dead organic matter or biomass. Associated with soil carbon accumulation is the accumulation of most of the soil nutrients required for plant growth and an overall increase in biodiversity. The table below, (Adapted from Fundamentals of Soil Science, H. Foth, 1990) lists relative and absolute distribution of organic matter in the top 15 cm (5.9 inches) of soil from a location with a climate similar to that of Belize and that has a relatively high organic matter content of six percent. Note also that the total biomass or weight of the total microbial community combined (bacteria, actinomycetes, fungi, algae, and protozoa) contribute only 0.21 percent to total soil organic matter content. Unfortunately, no potential yield for corn or sugar cane or vegetable crop for this particular soil is available, nor is a native plant community described.

Table Estimates of organic matter in a hectare of soil to a depth of 15 cm in a humid temperate region.

<table>
<thead>
<tr>
<th>Component</th>
<th>Dry Weight %</th>
<th>Dry Weight Kg/hectare</th>
<th>Estimated No. of individuals (15 cm depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Organic Matter, live and dead organisms</td>
<td>6.00000</td>
<td>120,000</td>
<td>300-10,000 species</td>
</tr>
<tr>
<td>Dead Organic Matter</td>
<td>5.28000</td>
<td>105,400</td>
<td>---</td>
</tr>
<tr>
<td>Live Plant Roots</td>
<td>0.50000</td>
<td>10,000</td>
<td>---</td>
</tr>
<tr>
<td>Bacteria and Blue-green Algae</td>
<td>0.10000</td>
<td>2,600</td>
<td>2x10^8</td>
</tr>
<tr>
<td>Actinomycetes</td>
<td>0.01000</td>
<td>220</td>
<td>6x10^7</td>
</tr>
<tr>
<td>Algae</td>
<td>0.00050</td>
<td>10</td>
<td>3x10^4</td>
</tr>
<tr>
<td>Protozoa</td>
<td>0.00500</td>
<td>100</td>
<td>7x10^6</td>
</tr>
<tr>
<td>Fungi</td>
<td>0.10000</td>
<td>2,000</td>
<td>8x10^6</td>
</tr>
<tr>
<td>Nematodes</td>
<td>0.00100</td>
<td>20</td>
<td>2.5x10^9</td>
</tr>
<tr>
<td>Earthworms</td>
<td>0.00500</td>
<td>100</td>
<td>7x10^3</td>
</tr>
<tr>
<td>Springtails</td>
<td>0.00010</td>
<td>2</td>
<td>4x10^5</td>
</tr>
</tbody>
</table>

In many agricultural soils, mechanical and chemical treatments are the dominant methods used for yields of harvestable plants species. The intensity of mechanical and/or chemical treatment application in terms of costs (fuel and chemicals per acre) required to produce a consistent yield for a given crop species varies significantly in Belize, but overall use of chemicals has become widespread regardless of the number of the acres per farmer. Nevertheless, commercial farming basically leads to 1) nutrient harvesting or mining of soil chemicals, followed by 2) accumulation of unknown amounts of pesticides and chemical residues and 3) destruction of soil structure. The later destruction of soil structure is associated with decreases in total soil organic matter content and the collapse of soil pore space resulting in increased soil bulk density or weight for a given volume of soil. Plant growth is generally negatively correlated with increasing soil bulk density. The potential to reverse trends in soil carbon losses is most effectively accomplished with the use of live manures preferably composed of plant species native to Belize rather than specific manipulation of soil microbial diversity. Even low carbon soils in Belize probably retain sufficient microbial diversity, so the benefits of inoculation of soils with specific species of microorganism to enhance recycling of specific soil nutrients would probably be minimal. Controlling the source and the amount of the organic matter returned to low carbon soils should be an important goal of all farmers in Belize, whether they are farming half an acre or 5,000 acres.

Comments can be sent to stephen.zitzer@gmail.com

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Update On Avian Influenza
By Dr. Miguel Depaz

Avian influenza (AI) is a highly contagious viral infection, primarily in avian species. Clinical signs range from inapparent in wild birds to a rapidly fatal condition in domestic poultry.

The World Organisation for Animal Health (OIE) requires notification of this disease once the subtype is H5 or H7 due to its zoonotic (affect humans) potential and the virus's ability to mutate into a highly pathogenic avian influenza which may cause high mortality in poultry and great economic loss.

BAHA through its active surveillance for avian diseases detected, for the first time in Belize, Avian Influenza H5N2 on January 14th, 2015 at two poultry farms in Spanish Lookout, Cayo. The detection was confirmed by the OIE reference laboratory, The National Veterinary Services Laboratory (NVSL), USA. The two poultry farms were immediately placed under precautionary quarantine and the implementation of six checkpoints to control the movement of poultry and poultry products in the area was begun. BAHA has also increased surveillance in the area to determine the spread of the disease. As a result of this increased surveillance 20 other farms have tested positive to the Avian Influenza H5N2 antibodies in Spanish Lookout and an adjacent village (Buena Vista Village). Neighboring countries, Guatemala, El Salvador and Mexico have in the past reported the Avian Influenza H5N2 disease and it is suspected that the introduction to Belize may have been from one of these countries or from migratory birds as they are known to be reservoirs of the AI virus. The disease in Mexico had great negative impact on the poultry industry as the virus had mutated to its highly pathogenic form.

BAHA, in coordination with the Ministry of Natural Resources and Agriculture, Ministry of Health, Belize Poultry Association and other relevant stakeholders, are implementing control measures to contain and eradicate the Avian Influenza H5N2 disease outbreak. The control measures currently in place are part of BAHA's emergency disease response plan and include the depopulation of infected poultry and destruction of possible contaminated eggs from the infected farms. So far a total of approximately 53,737 birds have been euthanized and 446,052 eggs destroyed in an effort to eradicate the disease. Continuing surveillance demonstrates that the disease is being contained in Spanish Lookout area and BAHA will only consider vaccination for control and eradication if the disease becomes widespread as vaccination brings along its challenges. Immediate expenses incurred may well be over 3 million Belize dollars for the control and eradication of avian influenza.

The Avian Influenza H5N2 disease can move easily through movement of sick animals, people or any contaminated poultry product or farm equipment moving from the infected farm to another poultry farm. Therefore the movement control measures are crucial for the containment and eradication of this disease. If the Avian Influenza H5N2 disease is not effectively contained it can spread countrywide and threaten our main source of protein, food security and the livelihood of many Belizeans. The total agricultural output in 2012 for Belize was 607.4 million dollars of which the poultry industry contributed 86.6 million dollars. Should these measures not be sustained the potential impact to the poultry industry and the nation will be devastating.
Twelve species of Chamaedora are reportedly found in the understory beneath the forest canopy of Belize. Three of these have value for cut leaves, the best known being Xate. As usual I search for plants that are edible and nutritious giving us interesting food alternatives. The Chamaedora tepejilote, date palm or Pacaya is an attractive ornamental palm but also produces a vegetable well known to many as chib. The tree thrives in shady locations and usually grows a single trunk reaching as high as twenty feet but there are also clumping varieties. The petiole has a prominent yellow stripe, the tree produces very showy decorative berries and the male and female flowers grow on separate trees. The stems can be used as heart of palm but the prize is in the male inflorescence which is the delicacy grown commercially in Guatemala and canned for export. The female flower is reportedly tastier than the male but not as readily available and reserved for special occasions in some places. The chib is mostly eaten fresh and planted in home gardens. It grows abundantly in Central America and has huge commercial potential. I found studies of production and forest management which say that by removing fifty per cent of the trees leaves the male plants produced twice as many inflorescence. Useful information if you decide to cultivate. The palms have great longevity so you can plan on harvesting for many years.

The Collins and Oxford dictionaries define chib as a sharp pointed weapon which is exactly as this bayonet appears. A chibouque is a Turkish pipe or a tube and I would assume that the words hail from the same root. The tepejilote, which looks somewhat like an ear of corn, means mountain maize in Nahuatl. The immature flower is encased in the hard outer shell of the chib protected by hair-like spines. Be careful to split it open lengthwise so as not to break the flower tips. Open to produce a pale green centre of squid like tentacles. This is what we seek. It can be eaten raw but does have a bitter taste, therefore better blanched in boiling salted water for a few minutes. It is the tentacles that you eat; so shorten the stem at the base which is quite acrid. You can also roast or boil whilst still in the casing and then remove, but some of the bitterness is retained.

Here is a quick and delicious gourmet way to enjoy:

6 Pacaya chibs prepared and boiled in salty water for a few minutes.

5 egg whites beaten until stiff

Fold in 1/4 cup of corn flour (maize) or flour and salt and pepper to form a batter. Add a little chilli powder. Now drape the flowers in the batter. Heat oil to fry and gently drop in the flowers, turning until golden brown. Serve with rice and tomato salsa.

This dish is traditionally made in Holy Week and also for All Souls Day which is when the flowers are more abundant. You can also chop it up in an omelette or scrambled eggs. Your choice; experiment. The taste and texture are similar to baby corn with a slight bitterness. Pacaya chib is rich in calcium, a good source of protein and vitamin C while being low in calories, cholesterol, fat, salt and sodium.

I have walked past these trees many times and have even photographed them because of their interesting black berries on brilliant orange stems, never realizing that an exquisite meal was close at hand. Caution: many palm fruits are highly toxic so better to avoid the berries. Eating on the wild side and being involved with the hunting and gathering of my own food is most rewarding but I am definitely planting Pacayas in my backyard.

Send any ideas, comments, or information you care to share.

Jenny Wildman
bayshorelimited@gmail.com

Photo by Xen Wildman
The Soils of Belize by District/Region  
Northern Regions-continued  
By Harold Vernon

The Xaibe Plain land system extends across the southern border of the Corozal District into the Orange Walk District. The recent alluvium soils of the western Corozal District and contiguous northwestern Orange Walk District contain some swampy areas due to limited drainage across the Bravo Hills that originates from the land region. The dominant drainage course is in the Rio Bravo into the Rio Hondo. The only alluvium found is in large solution basins in the north, the Neustadt Swamps. This area is an open savannah plain and low marsh forest plain based on recent alluvium. Wetness, low nutrient availability, severe workability and root room limitations as well as anaerobic conditions preclude development and these soils are marginal to moderate in suitability for rice. Most of the better lands have been taken up by sugar cane production. Another feature of this area is the occurrence every few years of severe flooding which can last for weeks in some areas.

Moving west by southwest takes us deeper into the Orange Walk district where better soils that have arisen from recent and old alluvial deposits occur. These alluvial deposits lie on top of older limestone deposits that are not as exposed as those soils further north. The soils tend to have better drainage as they form the Rio Bravo basin. There are areas of broken ridge mixed with broadleaf forest which is a transition zone to the pine ridge areas occurring further south as is found in August Pine Ridge. To the northwest we have a ridge of low hills and an upper plateau that extends to the border with Guatemala. The Mennonites of Blue Creek produce flooded rice on the flatlands whereas upland rice and corn are produced in the upper areas. The soils located in the area traversed by the main highway leading to San Felipe are typically based on limestone deposits which are soft and indicate a low magnesium content. Leaving west from Orange Walk Town, we see that the villages along the road all have shallow soils. Only a few areas that have metamorphosed into vertisols or heavy black clay soils have a reasonable-to-good fertility but are mechanically difficult to cultivate and poor in phosphorous. Although cattle farming is commonly observed in the area, it is not necessarily an indicator of the condition of the land. Cattle forage diets in this area typically need trace mineral licks. Sugar cane is grown in almost all areas.

As we go further south, the soils start to improve and we treat the areas west of Shipyard and south of Neustadt as some of the most productive soils in the district. A number of areas have fine red loamy soils which are currently being used to produce corn and papayas. There are occasional outcroppings of limestone which have to be picked and cleared of these stones for mechanized production. A number of areas starting from San Felipe going south are being developed all the way into Lamanai and Indian Church. These areas are recipients of recent alluvium and can be classified as inceptisols and entisols. The dense vegetation of these areas does not necessarily indicate deep soils although many better and deeper soils can be found as well as along the southern course of the New River Lagoon.

The Rio Bravo Conservation Management Area takes up a significant acreage of the Orange Walk District but is ignored in this report as it is likely to remain outside the realm of cultivable lands.

Next issue we take a look at the peaty bogs and flooded soils as well as the pine ridge areas on the eastern side of the district.

Send comments and questions to: hmvernon@yahoo.com
When CARICOM member states met in September 2014 to discuss regional agricultural policy and strategy, they assessed the region’s food imports and made recommendations for production and trade opportunities in foods. They recognized that the Caribbean is heavily dependent on imported foods. With a population of 16M people in the 15 CARICOM countries, the annual food import bill is in excess of US$4 Billion. This figure has doubled in the last 10 years.

Further, they recognized that often these imported (and often processed) foods also contribute to the increasing incidence of diet related diseases. Thus the CARICOM delegates have been seeking alternative commodities which can reduce the import bill and increase consumption of healthier alternatives. Cassava and sweet potato were identified as fitting the bill to remedy some of these issues. “Their analyses show that there is a huge untapped import-substitution market opportunity for flour, feed and beer (and possibly energy, if volumes permit) that can be addressed by utilization of cassava.”*  

Belize we know has the conditions to grow good cassava. At this time there is one commercial cassava factory in Belize, Sabal Cassava Farm, at 3 ½ Miles Stann Creek Valley Rd, Stann Creek District. They have been growing mainly 2 varieties of cassava from the same germplasm for about 20 yrs; the white on about 12-15 acres, and the yellow, on about 3 acres, all close to the factory. The white one is primarily used for the bread and farina and the yellow is sweeter and preferred for chips. They note that the yellow is less disease-resistant. Mr. Cyril Sabal says that the biggest task for planting is preparing the beds. They manually plant (using 10-12 inch ‘sticks’) between April and June of each year, and manually harvest any time after 9 months. Their normal harvest is about 1,000 lbs/ac, or 20,000 lbs, with each individual plant giving about 8 lbs of tuber. The national average for cassava production is not as high as Sabal’s. In the south, it is about 750 lbs/ac and the overall country average is less than 20 lbs/acre. This decline has been noted especially over the past 12 years. ECADERT is working with farmers in the south on over 90 acres. HarvestPlus organization, who visited Central Farm’s Research and Development Unit last month, also made a field trip to the Sabal Farm. HarvestPlus is very keen to work with Belize, to assist us to improve the germplasm with more nutritious varieties (not bio-engineered).

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Cassava... Continued from page 12

and with ideas and miscellaneous assistance. (See pg 18-19 in this issue for more on HarvestPlus.)

Mr. Sabal feels that the key to enlarging his enterprise, is financing. He does not see how cassava farming/processing, or any farming enterprise can thrive with the high cost and short terms of loans currently offered to the ag sector. He has been processing since about 1985, and much of the equipment was custom made by his father or by himself and is still quite satisfactory for the work.

8 lbs of raw cassava will yield approximately 1 lb of flour. The cost of the cassava farina from Sabal is $4.00 lb (Bz$), which is also about the average cost for all of the Caribbean ($3.80). Cassava can and is being used in many countries, in bread, with between a 15 and 40% substitution for wheat. In Brazil, in the school feeding programs, the government mandates that a certain % of cassava flour be used in all bread products. The price of cassava flour in Brazil also surpasses wheat. This sets a challenging situation for us in the Caribbean – how can we learn to replace wheat that is imported for less than Bz$1.00 / lb, for local cassava which costs us close to $4.00 / lb to produce? Mr Sabal estimates that with a 4 fold increase in production levels, he could halve the cost. Using some

of the byproducts may lower production costs also - the skins can be used as animal feed. The Sabal family successfully feeds their cassava skins to pigs. Cassava foliage can be fed to ruminant livestock, such as cattle. The leaves are said to be 22% protein, and are compared with alfalfa for nutrition and mineral content. However, caution must be exercised – the foliage for animal consumption must be cut early in the morning and then left in the sun for 5 hours for the cyanide content to dissipate. Columbia has much experience in this area, and they have also offered to assist Belize with technical assistance. Cassava planted for livestock feed is planted at different densities than that planted for tuber production.

Sabal’s products include: Cassava Bread (ereba) in plain, ginger and spicy; cassava farina; cassava starch; and King Cassava (by special order). They also do custom preparation of cassava, for local cassava bakers and pudding makers, etc, in Stann Creek and Hopkins. Sabal Cassava Farm can be reached at sabalharry@yahoo.com or at 532-2067, 666-1073 or 627-6136.

*CARICOM information sourced from G. Ramirez of Central Farm Research Unit, power point presentation at the HarvestPlus Roundtable Discussion on March 5, 2015.
Soil Analysis
A Necessity for Good Crops
By Neal Kinsey

If it were possible to accomplish improvements in just one step considering all aspects of soil fertility and fertilization, where would be the place to begin? Many answers will likely come to mind depending on the past experience of each person. But all types of growers from farmers to gardeners should consider that without a proper foundation on which to build an excellent soil fertility program, it will not be possible to achieve the full range of benefits that could otherwise be available.

Working with farmers and growers on fertility needs for all kinds of crops in all states of the US and many other countries, learning or obtaining the experience, knowledge and understanding concerning how excellent soil fertility works to benefit all crops has been most helpful. Taking a sufficient number of soil samples to show all those differences that can significantly affect crop quality and yield potential seems to be the most important step that is not normally taken seriously enough for the benefit of the land and those who live from it.

If all of the soil in a field were alike, it would all look the same, feel the same and grow the very same way. But that is seldom the case. If the soil has any major differences in texture, color, or plant population – even different weed or grass/legume populations – chances are the fertility will be significantly and measurably different as shown by using a detailed soil analysis. For farmers, consultants and all others dealing with soil fertility and fertilization this should be the principal goal, to help each farmer learn how a detailed soil fertility program that accurately identifies crop needs can become most helpful.

Just one year of experimentation is not usually enough to prove or disprove any soil program. Yet taking sufficient tests and following through for three years accordingly can definitely provide a convincing program. Such a program means doing everything that the annual soil test shows as needing to be done on an area large enough to gain the economies of scale for products like lime, gypsum, etc. but small enough not to cause nutrients that a good soil fertility program will provide. Start what is a reasonable degree of added production and increased value. Start small and then expand as your fertilizer budget allows.

Years of taking out certain nutrients without putting them all back should not be presumed to be adequately replaced in a single year and that at very little cost. Most land will need to be re-tested to determine what was required in each case. The tests came back recommending two tons of lime for the good and the bad pastures. This was an ongoing program, so every few years each field had to be re-tested to see if any more lime was required. That testing always showed the soil as needing two tons of lime. While digging post holes for a new fence just prior to the time when more testing was to be done the thought came to mind concerning how much this deep off-color subsoil would need since it had never been limed. He turned it in as a soil sample for one of his pastures. The answer came back that two tons of lime should be applied. He then said that after that he just kept a bucket of dirt in his shed and when it was time to test he just filled the sample bags from it. They always came back needing two tons of lime for which the government program paid the bill.

How do you build trust in a case like that without several years of testing as described above to show the difference?

Many years ago I remember reading about a survey done in Mississippi where they asked farmers if they believed soil testing should be done. 82% answered yes. Then they were asked if they used soil tests on their farm. Only 28% said they did.

You can only correctly manage the things you can correctly measure. And once it is established after three years of testing that you can trust a soil test for giving more than a general direction, the next question becomes how many samples should be taken.

USING ONE SOIL SAMPLE TO FERTILIZE THE WHOLE FIELD THAT HAS OBVIOUS DIFFERENCES DOES NOT WORK, LET ALONE USING IT FOR WHAT SHOULD BE DONE TO FERTILIZE ALL THE FIELDS ON THE WHOLE FARM!

When obvious differences can be detected in an area, if it is large enough to fertilize separately then sample it as a separate part of the field. If it is too small to sample and fertilize separately then stay out of that area and do not include probes of soil from there as part of the soil sample.

Prove to yourself on a small scale that it is worth the cost before you invest the time and effort and money that is required for the rest of the farm. Farmers and growers who try this on a reasonable area are usually shocked at how large a difference a program that can accurately detect true fertility levels and specific nutrient requirements needed to build or restore fertility to fields can make in terms of increased yield and nutritional values. Start small and then expand as your fertilizer budget permits. Spend money for fertilizer where it is most needed. Too often, that is not happening even on farms with plenty of manure or compost.

Years of taking out certain nutrients without putting them all back should not be presumed to be adequately replaced in a single year and that at very little cost. Most land will need to be tested and fertilized for at least three consecutive years to learn what is a reasonable degree of added production and increased nutrients that a good soil fertility program will provide. Start with one reasonably sized area that will allow doing just that. Then after three years each farmer will better understand by personal experience what the program can provide for that land, especially if you split a field and keep doing what has always been done on the other half.

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KINSEY’S AGRICULTURAL SERVICES
soil fertility consultant

Problems with crop quality, poor yields?

We specialize in correcting soil fertility problems of farms, ranches, vineyards, orchards, gardens and lawns...

Benefit from our more than 30 years of field experience. Working with growers in all 50 U.S. States and more than 65 countries around the world, balancing and maintaining the soil to obtain quality crop production.

We have helped clients improve both the quality and productivity of their soil through increased fertility in all types of situations, including conventional and no-till farmers utilizing the most effective conventional fertilizer sources.

“Thanks very much for last year’s [recommendations]. It was the best corn crop in this area ever. We think we averaged over 200 bu per acre. The highest check we happened to take was 265 bu per acre which was the second highest that our Pioneer dealer took. Most beans were in the lower 50's in this area but ours averaged 60.”

Randy Vogeler, Garrison, Iowa

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$12 Million Project to Boost Belize Forests

By Dottie Feucht

“We like our forests and waterways; we want them protected from illegal logging, runoff of agrochemicals upstream, and deforestation. We look forward to working together to achieve the goals.” These were some of the comments of the citizens groups in response to the project plan presented by Tanya Santos Neal, project manager, and Eugene Waight, project officer, at the official launching of the project on March 25. Funded by the Global Environment Facility and administered by The World Bank, the five year project aims to manage and protect natural habitats of high conservation value, called Key Biodiversity Areas (KBA), that total more than 500,000 acres including:

1. Fresh Water Creek Forest Reserve
2. Spanish Creek Wildlife Sanctuary
3. Vaca Forest Reserve
4. Chiquibul National Park
5. Maya Mountain North Forest Reserve
6. Columbia River Forest Reserve

Mr. Enos Esikuri from the World Bank said that in other parts of the world Belize is known for its pristine forests and waterways. Indeed, Belize has the largest forest coverage in Central America but deforestation is alarming. In November, 1980 74% of Belize was forest; by June, 2014, that percentage dropped to 60.3%. The largest amount of the grant money has been allocated to sustainable forest management. Implementation plans include establishing regional rapid response fire brigades and campaigns for public awareness of fire prevention practices.

Senator Honorable Charles Gibson said that Belizians traditionally have used natural resources and stressed that protected areas don’t do any good unless the populace can benefit. The project plan calls for a balance between environmental management and development needs. Through culturally appropriate consultation forty-nine communities adjacent to the KBAs are to participate in the project in the form of capacity building, strengthening value chains for forest products managed in a sustainable way, and assistance in the development and monitoring of management plans to ensure healthy and sustainable forests and ecosystems.

The citizen organizations that attended and spoke at the project launch were National Association of Village Councils, Corozal Sustainable Future Initiative (co-manager of Freshwater Creek Forest Reserve), Rancho Dolores Environment and Development Group (co-manager of Spanish Creek Wildlife Sanctuary) and Friends of Vaca Forest Reserve, who are farmers in the reserve who agreed to and want to pursue sustainable farming practices.

The KBA Project is being implemented by the Ministry of Forestry, Fisheries, and Sustainable Development (MFFSD) in collaboration with the Ministry of Natural Resources and Agriculture (MNRA), the Ministry of Economic Development and Finance (MEDF), the Ministry of Local Government and Rural Development (MLGRD), the Ministry of Tourism and Culture (MTC), the Protected Areas Conservation Trust (PACT) and Association of Protected Areas Management Organizations (APAMO).
BEL-CAR UPDATES

By Beth Roberson

As usual, BEL-CAR is keeping up with the world, with their CEO Otto Friesen serving as an unofficial ambassador of our growing Belizean agricultural community. Otto and another traveled to Las Vegas, USA, to attend a conference for CICILS. "CICILS is the not-for-profit peak body for the whole global pulses industry value chain. As the sole international confederation for the industry, it enjoys membership from 18 national associations (federations) and over 600 private sector members in an industry worth over $100 Billion at the retail level and over 60 M tonnes in pulse production and distribution in over 55 countries."* CICILS is headquartered in Dubai.

Corn - Last year’s corn crop is diminishing nicely – enough for the local market and some sales to Guatemala (mainly for pig feed). The buyer of last fall’s bulk corn shipment (see last issue #27, pg 16) is negotiating for another bulk load, but supplies do not warrant another bulk sale until the new crop arrives. Guyana’s rice flood (flood of rice not water), now with a 2nd year of bumper rice crops, is still hampering Belize’s corn sales (see issue 27, pg 16 and this issue, pg 36). Some in the Caribbean switch cheap rice for our premium corn.

Beans – Currently there is a world shortage for black eye peas and black eye prices are up. This would put Belize in a good situation except for the quality this year. The harvesting was still going on at time of the interview for this article, as there was a 6 wk. time span planting. The quality of the first planting does not indicate it reaches world market standards. Europe wants better, in size as well as quality. Black eyes are a bit more particular than other beans, as they require at least 2 weeks with no rain right before harvest. All black eyes are all desiccated in Belize. If they are not, the green leaves and plant parts will tint the beans. Usually the contact herbicide paraquat is used. Spanish Lookout’s red kidneys were a record-breaking crop. RK prices are low as BEL-CAR has a huge crop to sell. They are working to recapture the Caribbean markets adversely affected by high prices last season. The Caribbean at that time switched to some degree, to consuming the little reds.

Other products – Chia – BEL-CAR has 6 containers (50,000 lbs per) of chia (Salvia hispanica) packed and is seeking a buyer. The world market for chia somewhat collapsed when there was a recall on US and Canadian organic chia. BEL-CAR’s chia is not organic.

*Extracted from  http://www.cicilsiptic.org/about-us
PUROXI: Hydrogen Peroxide Based Water Treatment Product Helps Protect and Increase Profits In All Types of Farming

By Beth Roberson

About 3 yrs ago, Spanish Lookout poultry producer (broilers and layers), Dennis Dueck, heard about a water treatment product which helped farms obtain ‘clean, clear nutritional water’, and treated ‘water as a nutrient’ which would ‘boost the immune system’ of animals and at the same time ‘helped reduce dependency on antibiotics’ and even increase feed conversion rates. As this seemed almost too good to be true, Dennis followed up with more inquiries, then purchased a system and product. Eventually he became the country distributor for B.C. Canadian company, Puroxi Pure Water Global Inc. This led to the opportunity to expand distribution further into Latin America and the Caribbean.

The home company has been in business for over 7 years, while the product is 17 years old. The company is now a leader in the water purification business. The science behind Puroxi Water is simply that it has found a way to stabilize hydrogen peroxide (H2O2) and customize it with natural formulas which breaks down to oxygen and water once used. Viruses and many contaminants hate oxygen and/or do not thrive in an oxygenated environment. Chlorine has been and is still commonly used in many industries as a disinfectant. Chlorine though, is very harsh, and actually some chlorine treated products, such as chicken meat cleaned with chlorine, are currently banned in the EU.

Currently 26 poultry farms, 2 dairy farms and 11 households/swimming pools in Belize (Spanish Lookout and other areas) are using Puroxi. Dennis reports that ‘before I was on Puroxi OB on my broiler farm, I did have to use anti-biotics to keep the birds healthy the best I could. Losing a day or 2 of growth in broilers is a big part of their life. I have not used any anti-biotics in my broilers for the last 2 ½ yrs... I am in the top 10 farmers {poultry farmers of Spanish Lkt}.’” Another poultry farm customer of Puroxi OB boasts that before they used the product they had a feed conversion rate of 1.95; now that is less than 1.8. On 3 trials done from September 2014 thru January 2015, Dennis had daily average gains from .118 to .127 lbs/day. The feed conversions ran from 1.8, 1.83 to 1.75.

Use as foliar spray: Currently Puroxi Pure Water Global Inc. and Puroxi Belize are running trials in Guatemala using Puroxi against the Central American coffee rust (Hemileia vastatrix). Puroxi is being used with success in at least 8 gardens/crops in Spanish Lookout and beyond at this time. In Belize some are also trying the foliar spray for treating/preventing the dreaded corn ear worms (Ostrinia nubilalis). In Florida work is being done to see how it can help curb HLB (citrus greening). There is no cure for HLB, but some claim that treatments can at least help make the trees exhibit fewer symptoms and be more productive.

The first step to exploring use of this product is to have your water tested; only then can Dennis give an estimate of what kind of (injection) pump and equipment are necessary for delivery into your water system. Costs range about $1,500. per pump, and one will probably handle a barn with between 1,000 -20,000 birds. See the ad below for contact information.
Nutrient-Smart Agriculture Arrives in Belize
HarvestPlus Agronomists Explain Biofortification

By Maruja Vargas

The recently concluded Second International Conference on Nutrition (ICN2) in Rome, Italy, identified nutrition-sensitive agriculture as one of the priorities in the quest to end global hunger and malnutrition by 2025. The conference outcome commits world leaders (attendant 170 countries) to establish national policies aimed at eradicating malnutrition and transforming food systems to make nutritious diets available to all.

According to the World Health Organization (WHO) two billion people worldwide suffer from hidden hunger. Two-thirds of all deaths, globally, are now diet-related (The Lancet, 2012).

Global food systems are failing because they have neglected the most fundamental purpose of the agricultural systems—to nourish people. The global community is now calling on agriculture to respond to what the Copenhagen Consensus has twice in the past few years identified as the greatest challenge facing humankind—poor nutrition caused by a lack of vitamins and minerals in the diet on a warming planet.

We need to re-envision agriculture as the primary source of sound nutrition through the food people harvest and eat. This is a radical concept in the true sense of the word — returning to the root or fundamental purpose of agriculture.

No single intervention will solve the micronutrient malnutrition problem. The permanent solution in developing countries is a diverse diet that includes pulses, fruits, vegetables, fish, and animal products. For the poor, this may take decades to realize. By providing some of the recommended daily allowance for micronutrients, biofortified crops can be effective in reducing malnutrition due to micronutrient deficiencies.

Agricultural policies encouraging plant breeding research that improves the levels of nutrients in cereals and other staple crops is often called “biofortification.”

The diets of the poor in developing countries usually consist of very high amounts of a staple (carbohydrate) food (such as maize, wheat, or rice) but few micronutrient-rich foods (such as fruits, vegetables, and animal and fish products). Staple foods are targeted for biofortification because the population as a whole consumes staple foods, so the entire population of a region benefits by this strategy.

Biofortified crops are conventionally produced by selective cross-breeding known to all agricultural people. They are not produced by techniques associated with genetically modified crops involving the insertion of gene(s) foreign to the original cultivar. The requirements for the resultant biofortified cultivars are: higher values of the selected nutrient (for example, iron, zinc or vitamin A), yields commensurate with present commercial hybrids, natural pest resistance, and lastly, drought resistance in recognition of the potential impact of climate change on staple crops.

As an example, the cross breeding of beans has been a 5-year program, the results of which have increased the available iron 60% to 100% from 50 ppm to 80 ppm. In tandem with the increased nutrient content, scientists found 30 new types of beans that are tolerant to heat and could ensure sustained production in bean-dependent Africa and Latin America. Steve Beebe, a senior bean researcher at a global agricultural research partnership (CGIAR), stated, “Incredibly, the heat-tolerant beans we tested may be able to handle a worst-case scenario where the build-up of greenhouse gases causes the world to heat up by an average of 4 degrees Celsius (about 7.2 degrees Fahrenheit).”

Combining high-nutrient value with “heat-beating” quality, iron beans allow farmers to simultaneously improve nutrition and expand production even in the face of climate change.

New varieties of seven staple food crops that contain more of these vitamins and minerals are now widely available. These include vitamin A cassava, maize, and orange sweet potato; iron bean and pearl millet; and zinc rice and wheat.

HarvestPlus, an international agricultural non-government organization (agro-NGO) operating in 40 countries, is at the forefront of the global effort to develop and distribute biofortified seeds. Their promotional efforts focus on “Eat food to be healthy”. 

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The Ministry of Natural Resources and Agriculture (MNRA) researchers at Central Farm, became aware of this program in 2014, and in coordination with the Ministry of Health (MOH), in alignment with Belize national food security policy, decided to further investigate the opportunity to elevate the level of health well-being for all Belizeans.

Last year, MNRA, at the invitation of Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), which is the Brazilian government’s agricultural research corporation, sent Belize personnel to Brazil to study the Brazil Biofortification Program. Subsequently, MNRA, in cooperation with MOH, hosted a week-long visit in March 2015 of renowned Brazilian agronomist, Dr. Marilia Nutti, and Dr. Jose Luiz Viana de Carvalho, both affiliated with HarvestPlus and EMBRAPA Food Technology in Brazil.

Dr. Nutti is the coordinator of the Brazil Biofortification Network, and recently appointed Director for HarvestPlus for Central and South America. Dr. Nutti with her research associate, Dr. Jose Luis Viana, made several presentations on the biofortification system, toured agricultural areas in the south and west of Belize, visited projects at Central Farm, the UB Central Farm cultivar propagation laboratory, and conducted interviews with various NGOs and stake holders.

Representatives of MNRA, MOH, the Belize Agricultural Health Authority (BAHA), Caribbean Agriculture Research and Development Institute (CARDI), Inter-American Institute for Cooperation on Agriculture (IICA), University of Belize Central Farm Campus, and agricultural extension officers, agricultural policy analysts, National Garifuna Council, and other non-government organizations (NGOs) participated throughout the week.

The research unit at Central Farm has begun the collection of germ plasm from various sectors in Belize to be cataloged at Central Farm in an effort to identify all the varieties in Belize. Dr. Nutti indicated that the Belizean cultivars can be tested in Brazil, and could form the basis of the biofortified crop seeds. Also, biofortified cultivars already developed in Brazil might be transferred to Belize, dependent on their suitability to the micro climates in Belize.

Why might Belize want to invest in biofortification? Simply, it is cost effective with far reaching returns. It is a one-time investment in a biofortified crop(s) that can generate new varieties for farmers to grow for years to come. It is the multiplier effect of biofortification across time and distance that makes it so cost effective as an investment. It is also sustainable as it reproduces itself. The seed is public property, not patented or controlled. The biofortification effectively targets specific nutritional needs.

For more information or if you wish to become a producer under this program, please contact Mr. Gary Ramirez or Ms.Teresita Balan at Crop Research and Development Unit, Central Farm, Cayo District, tel 804-4948, email nccard@agriculture.gov.bz The HarvestPlus site is www.HarvestPlus.org
Onion Research in Belize
By Teresita Balan
MNRA Research and Development Officer

In Belize, commercial onion (Allium cepa L.) production was started in 1988 through the efforts of the Ministry of Natural Resources and Agriculture (MNRA) formerly the Ministry of Agriculture and Fisheries (MAF). The objective was to promote diversification toward high income vegetable crops in the northern part of the country where most farmers were involved in sugarcane production. Because of falling sugar prices, the potential loss of preferential market and an ever increasing food importation bill, the ministry’s plan was to increase locally produced crops.

Onion research started with the establishment of onion variety plots in the Cayo and Orange Walk Districts. After eight years of field evaluation, the results indicated that the northern part of country was most favorable for onion production due to its agro-ecological conditions. As a result, today the Corozal and Orange Walk Districts are the major producers of onion followed by the Belize District. Only a few farmers grow onion in the Cayo District.

The total annual demand for onions is around four (4) million pounds. Belize consumes an estimated 60,000 to 80,000 pounds of onions weekly. The Corozal District produces 62 % of the national production (MNRA statistics 2014). Since 1988, average yield has increased gradually from 4,811 lbs/acre to almost 37,000 lbs/acre. The average onion yield per acre over the last five years is 18,423 lbs/acre (MNRA statistics 2010-14). Nevertheless, to meet national demand the country still imports about one (1) million pounds of onions every year during the off-season.

After more than twenty-five years of producing onions in the country, many farmers have progressively improved their field management and post-harvesting practices and are now increasing acreages in hopes of addressing the annual production shortage. The annual planting cycle can be divided into two crops that are planted consecutively, one crop entirely for the fresh market (early planting and harvesting) and when possible, a second crop, a part of which may be consumed by the fresh market but the bulk of it designated for storage in hopes of having onions available during the off-season. Despite the progress however, there are still some challenges such as consistency in seed and varietal availability, contraband and development of technical information which needs to be addressed in order to improve onion productivity and production in Belize.

As part of the MNRA strategic objectives to promote inclusive, competitive and sustainable agriculture and food sector and also enhance services to agricultural and cooperatives stakeholders, the following were considered necessary for the development of the onion industry: (1) conducting varietal screenings and varietal evaluation according to local production systems (2) increasing application of technology, innovation, research and development to agricultural production (3) promoting sustainable agricultural practices and (4) identifying and validating adoptable technology and innovations to reduce crop losses due to pest and diseases.

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Have you a suggestion for an article topic or have a finished article about Belizean agriculture to share?......

MAY 2015 BelizeAgReport.com 20 Harvesting Ag News from All of Belize

Users of Pesticides: WHEN USING PESTICIDES, Protect Yourself! Protect Others! Protect the environment!

Consumers: Know where your food is coming from. Support farmers with good pesticide management practices.
Under the Agriculture Research Unit portfolio, onions are listed as one of the priority research commodities. The evaluation of the agronomic performance and storage capacity on existing and new onion varieties has been carried on for the past two years and will continue for the foreseeable future.

During this past planting season, varietal (6 varieties) and fertigation trials were conducted in the Corozal and Orange Walk Districts to evaluate the agronomic performance and storability of short and medium maturing onion varieties (mainly yellow and white onion varieties). The objective was to identify and select suitable varieties that are high yielding and that have excellent storage characteristics to meet our needs in Belize. Additionally, to address productivity concerns, crop trials have been expanded to include the implementation and validation of fertigation programs in onion production. The objective of this component is to assist farmers to maximize fertilizer use, reduce production costs and to adapt new technologies toward increasing crop yield.

For 2015-2016, the research unit plans to improve the level of collaboration with local agro suppliers which will assist in identification and access to new onion varieties for evaluation. Also to address potential climate impact on the onion industry, the unit will identify and evaluate long-day length varieties that can prolong the onion season in Belize. Currently only short-day varieties are planted in Belize during a planting season that runs from October to January of the following year and results in early harvest yields per year have varied widely, but generally are increasing as farmers and MNRA gain experience with the crop. From a meager 4,811 lbs/ac in 2001, to the highest yields in 2011 of 27,451 lbs/ac, one can grasp the potential of onion farming in Belize.

An Onion Technical Working Group is in the draft stages and will provide the MNRA with efficient mechanisms to evaluate onion varieties and access to new onion varieties for evaluation. Also to address potential climate impact on the onion industry, the development of an Onion Technical Working Group is in the draft stages and will provide the MNRA with efficient mechanisms to evaluate onion varieties and access to new onion varieties for evaluation. Also to address potential climate impact on the onion industry, the development of an Onion Technical Working Group is in the draft stages and will provide the MNRA with efficient mechanisms to evaluate onion varieties and access to new onion varieties for evaluation.

Ultimate, even the smallest improvement to the onion industry will help to reduce the national food import bill and improve food security in the country while promoting the consumption of locally produced food.
RICE PRODUCT INNOVATIONS

In the past year Circle R Products has made bold moves in their product packaging. These proactive moves are based on consumer insights and consumer demands—a model where the customer gets first place in business decisions. So what are these new products, and what makes them so innovative?

"From your farmer to your family—nothing in between! Jade rice is Extra Clean."

This is what Stanley Rempel, CEO of Circle R Products, has coined as the unique difference of this 5Lb format sealed rice package. Jade is a rice that comes with three promises.

First, the EXTRA CLEAN promise means the rice has been filtered of everything but the rice. The package is sealed so that consumers can open the bag, cook the rice, and serve it without worrying about impurities. Circle R Products’ promise of HIGH QUALITY means that each Jade bag is triple-checked to ensure that only the best product reaches your Belizean family.

Last, but not least, Jade rice comes with a HEALTHY AND NATURAL promise so that your family can grow strong with each serving. Jade rice is now being sold in stores throughout Belize.

Circle R Products has partnered with Belize Camping Experience in Belize City to create “Premium Rice with your kids in mind”, a unique rice that offers two promises of its own. It is 100% premium white rice, and it is socially responsible. Proceeds of each bag sold go towards giving less fortunate children the opportunity to attend summer camp. The more rice that is sold, the more kids can have fun! Check it out for yourself at BelizeCampingExperience.com

Keep your eyes open for even more innovations from Circle R Products as they look to launch two additional products into the market this year. Ruby rice will be a value-based product, affordable for all Belizeans. Circle R Products will also be unveiling an exciting new premium product later this year.

Whatever the year ahead holds, you can expect that Circle R Products will be leading the way with innovative products and packaging. To learn more visit CircleRProducts.com
Agriculture Prices at a Glance - $$$$$

**BELIZE CATTLE**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young strs./bulls-750-1100 lbs Sp Lkt</td>
<td>H 2.45</td>
<td></td>
</tr>
<tr>
<td>Young strs./bulls-750-1100 lbs Bl Crk</td>
<td>H 2.40 - 2.60</td>
<td></td>
</tr>
<tr>
<td>Cows / heifers for butcher Sp Lkt</td>
<td>H 1.75 - 1.90 heifers</td>
<td>1.65 cows</td>
</tr>
<tr>
<td>Cows / heifers for butcher Bl Crk</td>
<td>L 2.25 heifers</td>
<td>1.75 - 1.85 cows</td>
</tr>
<tr>
<td>Breeding heifers 500-800 lbs Sp Lkt</td>
<td>L 1.90</td>
<td></td>
</tr>
<tr>
<td>Breeding heifers 500-800 lbs Bl Crk</td>
<td>L 2.40</td>
<td></td>
</tr>
<tr>
<td>Young grass cattle - 350-650 lbs Sp Lkt</td>
<td>H steers 2.55</td>
<td>heifers 1.90</td>
</tr>
<tr>
<td>Young grass cattle - 350-650 lbs Bl Crk</td>
<td>H 2.70</td>
<td></td>
</tr>
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**U.S. CATTLE**

<table>
<thead>
<tr>
<th>Description</th>
<th>A $1.51 - 1.61</th>
<th>B $2.12 - 2.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaner pigs - 25-30 lbs - by the head</td>
<td>S 100.00</td>
<td>L 2.00</td>
</tr>
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</table>

**BELIZE SHEEP**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butcher lambs</td>
<td>L 2.75</td>
<td>2.50</td>
</tr>
<tr>
<td>Mature ewes</td>
<td>H 2.00 - 2.50</td>
<td>1.50 - 1.75</td>
</tr>
</tbody>
</table>

**BELIZE CHICKEN**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole sale dressed Sp Lkt</td>
<td>H 2.48</td>
<td></td>
</tr>
<tr>
<td>Whole sale dressed Bl Crk</td>
<td>H 2.46</td>
<td>2.50</td>
</tr>
<tr>
<td>Broilers - live per lb Sp Lkt</td>
<td>S 1.23</td>
<td></td>
</tr>
<tr>
<td>Broilers - live per lb Bl Crk</td>
<td>L 1.30</td>
<td></td>
</tr>
<tr>
<td>Spent hens per 4 lb bird Sp Lkt</td>
<td>S N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Spent hens per 4 lb bird Bl Crk</td>
<td>L 3.00 - 4.00 (20+ birds)</td>
<td></td>
</tr>
</tbody>
</table>

**GRAINS, BEANS & RICE**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belize yellow corn, bulk (Spanish Lookout)</td>
<td>H N/A</td>
<td>.24</td>
</tr>
<tr>
<td>Belize yellow corn, bulk (Blue Creek)</td>
<td>N/A</td>
<td>.22 - .23</td>
</tr>
<tr>
<td>Yellow corn/local retail (low volume) (Sp Lkt)</td>
<td>L .295</td>
<td></td>
</tr>
<tr>
<td>Belize white corn, bulk (Cayo)</td>
<td>L .29</td>
<td>.24</td>
</tr>
<tr>
<td>White corn/local retail (low volume) (Cayo)</td>
<td>L .29</td>
<td></td>
</tr>
<tr>
<td>Guatemala yellow corn price/Peten</td>
<td>L (145 quintal)</td>
<td>BZ$.4265</td>
</tr>
<tr>
<td>Guatemala white corn price/Peten</td>
<td>L (135 quintal)</td>
<td>BZ$.391</td>
</tr>
<tr>
<td>US corn</td>
<td>H US$ 4.25 / 56 lb bushel</td>
<td></td>
</tr>
<tr>
<td>US organic, yellow corn feed grade</td>
<td>S US$ 11.00 - 13.25 / 56 lb bushel</td>
<td>N/A</td>
</tr>
<tr>
<td>Belize soy beans (Spanish Lookout)</td>
<td>S .50</td>
<td></td>
</tr>
<tr>
<td>Belize soy beans (Blue Creek)</td>
<td>L .55 - .56</td>
<td>N/A</td>
</tr>
<tr>
<td>US soy beans, #2 yellow</td>
<td>L US$10.47 / 60 lb bushel</td>
<td></td>
</tr>
<tr>
<td>US organic, feed grade soy</td>
<td>S US$ 23.00 - 26.00 / 60 lb bushel</td>
<td></td>
</tr>
<tr>
<td>US organic, food grade soy</td>
<td>S US$ 28.00 - 29.00 / 60 lb bushel</td>
<td></td>
</tr>
<tr>
<td>Belize milo</td>
<td>None Available</td>
<td></td>
</tr>
<tr>
<td>Red kidney beans (Spanish Lookout)</td>
<td>L .80 farm price</td>
<td></td>
</tr>
<tr>
<td>Little reds (Spanish Lookout)</td>
<td>L .95</td>
<td></td>
</tr>
<tr>
<td>Black eyed peas (Spanish Lookout)</td>
<td>H .95 - .72</td>
<td>.80</td>
</tr>
<tr>
<td>Paddy rice per pound (Spanish Lookout)</td>
<td>S .40 - .53 farm price, dried</td>
<td></td>
</tr>
<tr>
<td>Paddy rice per pound (Blue Creek)</td>
<td>L .45 - .50 farm price, dried</td>
<td></td>
</tr>
</tbody>
</table>

**SUGAR/HONEY**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar cane, ton, 3rd estimate average</td>
<td>L est images 2014/15 crop: $60.45</td>
<td></td>
</tr>
<tr>
<td>Bagasse</td>
<td>S pending agreement</td>
<td></td>
</tr>
<tr>
<td>Honey per lb (Cayo)</td>
<td>S 2.50 (approximately 12 lbs/gal)</td>
<td></td>
</tr>
<tr>
<td>Honey per lb single source/varietal (Cayo)</td>
<td>S 3.75 (approximately 12 lbs/gal)</td>
<td></td>
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</tbody>
</table>

**CITRUS**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oranges per 90 lb box-lb, solid basis</td>
<td>L 10.1201/box, 1.7153 pps</td>
<td></td>
</tr>
<tr>
<td>Grapefruit - per 90 lb box</td>
<td>H 10.3360 / box (2.5210 lbs) est final</td>
<td></td>
</tr>
</tbody>
</table>

**CACAO**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cacao beans (TCGA) /lb</td>
<td>H 3.00 dried fermented</td>
<td></td>
</tr>
<tr>
<td>Cacao beans (TCGA) /lb</td>
<td>S 1.10 wet beans</td>
<td></td>
</tr>
<tr>
<td>US Cacao beans, New York, metric ton</td>
<td>L US$ 2,960.14</td>
<td></td>
</tr>
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</table>

**SPECIAL FARM ITEMS**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs - tray of 30 (Spanish Lookout)</td>
<td>H 5.505 farm price</td>
<td></td>
</tr>
<tr>
<td>WD milk per lb to farmer (Spanish Lookout)</td>
<td>H contract .57; non contract .57</td>
<td></td>
</tr>
<tr>
<td>Raw milk (farmer direct sales) (Cayo)</td>
<td>S 8.50 gal (5 gal + 8.00 gal)</td>
<td></td>
</tr>
</tbody>
</table>

**ONIONS & POTATOES**

<table>
<thead>
<tr>
<th>Description</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onions Cayo</td>
<td>36.00 /50 lbs</td>
<td></td>
</tr>
<tr>
<td>Red Onions Cayo</td>
<td>70.00 / 50 lbs</td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>105.00 / 100 lbs</td>
<td></td>
</tr>
</tbody>
</table>

Weather, weather, weather... always the farmer’s underlying concern, sometimes friend, sometimes worry. 2015’s dry season came on late, but with a ferocity not seen since 2005 – with a string of exhausting days over 100°F in the last days. As we print, the true rains have not arrived; many predict they will come with the full moon on May 4th, which would still be about 17 days earlier than the average arrival. Will the National Agricultural and Trade Show (NATS) on May 1st, 2nd, 3rd be sweltering or muddy? Prices for all our ag commodities are healthy. Sugar bagasse price is STILL pending. Avian Flu has not affected poultry prices adversely, so far, only that spent hens are not available in the west. Note that in this issue, we’ve added prices from the Blue Creek (Mennonite) Community in the north. Thank you Jacob Neufeld for directing BAR to sources. B. Roberson

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

Drop Into the Green - The Nohoch Ch’en Expedition

By Marguerite Fly Bevis

The seeds for the Nohoch Ch’en Expedition were planted years ago when Neil Rogers flew over the Chiquibul Forest and took the first images we had ever seen of the giant sinkhole. My husband, Jim Bevis, owner and operator of Mountain Equestrian Trails (MET), Cayo kept that photo above his desk for the next twenty odd years. This was one expedition he was determined to make happen. Jim approached Mr. Rafael Manzanero, Executive Director of Friends for Conservation & Development (FCD), for endorsement and to ensure that an expedition into this massive sinkhole would be beneficial to the development of the FCD Karst Management Program in this remote area of the Chiquibul. The answer was, “Let’s do it.”

The purpose of the expedition would be to document one of the most remote, rugged and unexplored locations in Belize and to hopefully further justify to Belize and the world, the uniqueness and value of this region as a potential World Heritage site. The Nohoch Ch’en sinkhole, the largest of 49 collapsed doline formations that are located mostly over the Chiquibul Cave System, is located in an area where surface water is very scarce, making it challenging to explore for long periods of time. Very little scientific information was available for this region of the Chiquibul National Park, let alone the forest environment at the bottom of the 650’ wide and 450’ deep sinkhole. In the year 2000, several members of the Millennium Expedition descended by rope into the sinkhole and made brief observations, but time did not permit exploration and little data was collected, as this was not the main focus of their expedition.

Jim spent months studying maps, making lists, planning every detail. He assembled a seasoned exploration team for the project: Jim Bevis, expedition leader, Marguerite Bevis (myself), camp nurse and communications coordinator, and our son, Arran Bevis, area exploration leader, have all led and outfitted expeditions into the Chiquibul since the early 90’s. Jim Allan, a world-class alpine climber and explorer, instructed and supervised the difficult technical climbs required. Neil Rogers is an adventure travel specialist who took the photo that inspired us all. Tony Rath, photographer extraordinaire, who’s well known images have attracted worldwide attention to the beautiful Jewel that is Belize, offered major support during the planning and implementation phase. Therese Rath, Tony’s lovely, vivacious, and energetic wife, was invited along to assist Tony and to cook, which she did amazingly.

Bruce Holst, of The Marie Selby Botanical Gardens is perhaps the world’s top specialist in epiphytes and other tropical forest plant species. He has been doing research in Belize for over 20 years and has collected and catalogued over 10,000 species of different flora here. Bruce’s assistant, Ella Baron, founder of the Caves Branch Botanical Gardens, also became a part of the team. They would spend all day finding and mapping new specimens, and then work for hours in the evenings sorting, identifying and pressing, plus saving live specimens for various botanical gardens, including the National Herbarium in Belize.

Other team members included Giovanni Martinez, level 3 rope rigger and natural history expert, as the rescue technician and lead medic; Nickolas Lormand, a film student from New Mexico; Joey Martinez, camp cook and “chain-saw Ninja”, when it came to clear the old logging road for the expedition to navigate deep in the Chiquibul; Hugo Orellano, camp cook and maintenance man; and Jairo ViaFranco, the “bush” mechanic who was able to fix anything and saved the day on several occasions.

The FCD Rangers were essential team members. Gliss Penados and Boris Arevalo contributed significantly to the scientific component of the expedition gathering data and mapping areas by GPS. There were other FCD Rangers whose vigilance and knowledge of the area, made for a safe working and living environment. These are the brave sentinels of the Chiquibul. They kept guard day and night and reported their observations of the presence of potential intruders. Their dedication and commitment to conserving the Chiquibul is inspiring.

Continued on page 25
Nohoch Ch'en...Continued on page 25

Having loaded two trailers, one with supplies, the other with passengers, twenty team members began the journey on January 26, 2015 into the deepest parts of the Chiquibul Forest Reserve. We drove the tractors/trailers to FCD’s Tapir Camp where we spent the first night. We travelled the good road almost to Millionario but at that point we had to reopen an old logging road that is about ten kilometers to the base camp location at the pass below Nohoch Ch’en. Reopening the road took three days. On the fourth day, after hours of backbreaking labor, just before dark, we set camp at our final destination.

MET donated a Weatherhaven 20’x20’ shelter to FCD. This was an opportunity to instruct the FCD Rangers to set it up for use as a base camp facility. The tent housed a charging station for everyone’s electronics and was powered by a small generator for a few hours a day to charge the 12 volt batteries for continued use after the generator was turned off. A large table was in the center for food preparation and serving. Along the edges of this tent was storage for food and equipment.

A water station was constructed to filter the dark tea-colored water brought from a Maya aguada every other day by tractor. After filtration the water was still slightly colored but purification drops were added for additional protection and nobody became ill.

On the first morning at the base camp, the scientists and photographers went to the top of the sinkhole for the first glimpse and images of this magnificent natural wonder. Others stayed in camp to set up the large shelter and a kitchen and build sanitary facilities. Thus began the daily routine of exploration and discovery. While some descended into the sinkhole by bosun’s chair, others continued to search for a source of water closer to camp and for an above ground entrance to the giant underground chambers of the Chiquibul Cave.

The scientists were constantly at work searching for epiphytes, and they were excited by what they found. Dr. Holst found over 50 species of orchids alone. Specimens have been sent to Marie Selby Gardens. At the bottom they discovered large boulders covered with mosses, ferns, and orchids, and a profusion of epiphytes.

Getting to the bottom of the sinkhole was not easy. A Harken winch helped to lower people down to a ledge about a third of the way down into the hole and then they could carefully make their way to the bottom. Each member was carefully harnessed and double checked for safety before descending or ascending.

Team members discovered small shallow holes in the vertical walls all around the sinkhole. One small cavern could be seen from across the rim and at the entrance were large Mayan pots. Climbers spent a day and a half accessing this cave, to photograph the three large storage urns.

What we know for sure is that the bottom of the sinkhole had not been explored or looted by modern man and it is extremely rich with various plants and epiphytes. Bruce Holst called the sinkhole and its rim, “exceptionally rich beyond words.” The only mammals seen in the sinkhole were Spider Monkeys that climbed effortlessly in and out of the sinkhole via cascading vines. A pair of Orange-Breasted Falcons were seen every day and are likely nesting in the sinkhole cliffs, but no nest was seen. Slate-colored Solitaires could be heard singing their incomparable flute-like song most days.

There also appears to be Mayan ceremonial temples on the west and east rims of the sinkhole and temples with plazas were found for miles in every direction near the sinkhole hill. Ancient Mayan agricultural terraces were everywhere. It became evident that the Maya did climb down into the sinkhole to build ceremonial places to leave pottery or mementos, presumably to honor the dead. It is unlikely anyone lived there.

There is no water in the bottom of the hole; however, possibly it was there in the day of the Maya. Nohoch Ch’ en means great well and water was a precious resource then and now. There was an aguada at the base of a Maya site near our base camp, which still holds water today. There was very little water elsewhere - a few muddy puddles but no creeks, no rivers. Water is the major limiting factor in planning this and future expeditions.

Also evident during the expedition, is that the area is heavily trafficked by intruders. There was a lot of Guatemalan branded trash around their campsites and trails. They are not taking just Xate; they are taking valuable hardwoods and wildlife and leaving behind garbage.

The area is at risk of becoming one big Guatemalan milpa. The issues are complex and there is no simple answer. In order to protect the Chiquibul, FCD requires the finances to sustain the efforts on the ground. Concerned citizens at home and abroad can help by supporting FCD. To know more on how to help visit the wwwfdcbelize.org website.

Photos by Tony Rath and Neil Rogers
Agriculture: The Continuing Pillar of Our Economy

By Zeidi Bowman of Atlantic Bank

Agricultural exports have increased by 32% from $322.2 million in 2011 to $481.0 million in 2014, and accounted for up to 80% of total exports in 2014, despite declining total export levels over the same period ($680.9 million in 2011 - $602.9 million in 2014) caused mainly by decreasing exports of crude petroleum.

The traditional sub-sectors including marine products, sugar, citrus, and bananas have maintained their stronghold, while other non-traditional exports like pepper sauces, citrus oil (orange and grapefruit), grains, corn meal, and others accounted for 15% of the agricultural exports. Non-traditional exports have increased by 53% from $47.8 million in 2011 to $73.0 million in 2014, showing the growth trend in the sub-sectors.

These figures show that the agriculture sector continues to be of economic significance and is classified as one of the strongest economic pillars of the Belizean economy. As export earners as well as an import substitute, all agricultural products give Belize its sustainable economic strength and its status as a serious trading partner in the region. The agriculture sector’s short and long-term prospects for Belizean prosperity continue as good and even better than they were in the era prior to oil exploration and exports.

Investors across the world and especially in Central America are beginning to look at Belize as an economic bridge to the CARICOM markets and as a way to satisfy some of the growing food needs of neighboring countries in Central America and Mexico.

Banks continue to revise their strategic approach to this sector and its prospect for fostering increased economic activity in both the short and long term. Agriculture with its many sectors and sub-sectors can bring much needed economic and prosperous activity to Belize and its people effectively utilizing the available liquidity in the banking system as development increases and export earnings grow.

Atlantic Bank has a history of assisting in the growth of the agriculture sector, especially the non-traditional sector that other banks considered too risky.

As a strong participant in non-traditional agriculture lending, Atlantic Bank has managed to offer financial support with repayment schedules that match planting and selling cycles, showing that even with the inherent risks, partnerships between Belizean agricultural enterprises and banks have served the country well. Atlantic Bank’s interest in the productive sector and our drive to assist our trade customers has prompted us to strengthen our strategies. Our Atlantic Bank Ltd. Trade Finance Program is a comprehensive program that offers not only financing at concessionary rates, but also international services. Revolving trade lines are available for short term import/export trade requirements.

Continued on page 25
Agriculture....Continued from page 24

This financing at reduced interest rates is available for the purchase of equipment, stock, inventory and basic grains.

Once there is an established export contract, we can also provide pre-export financing so that operations can continue until payment can be received from the foreign buyers. If financing is not necessary but there is some doubt between the legitimacy of buyer and seller, a protective instrument called a Letter of Credit can be established by the trusted banks of the buyer and seller, ensuring payments to seller and delivery of goods to buyer. Letters of credit are more secure methods of payment since they involve the banks in both the buyer’s and seller’s countries. It is important that Belizeans become more aware of the risks in trade, as well as the internationally recognized instruments used to mitigate these risks. Atlantic Bank Ltd’s slogan “Building the future together” communicates our commitment to the development of our country. We are confident that we can continue to meet the needs of our customers and increase our support of importers.

Note: All export statistical data was gathered from the Statistical Institute of Belize.

DOE and Renco Work Together

Recycling Batteries

Lead acid battery recycling is one of the most successful recycling programs in the world. In the United States 99% of all battery lead was recycled between 2009 and 2013. The two components that make this product hazardous are lead and sulfuric acid. Some lead compounds are extremely toxic. Long-term exposure to even tiny amounts of these compounds can cause brain and kidney damage, hearing impairment, and learning problems in children. In Belize the Department of the Environment (DOE) along with Renco Battery launched a lead acid battery recycling program in 2004 and it functioned for only about 2 years. Now they are trying to resurrect the program and collaborate with other retailers and the public. The main aim of the program is to ensure the safe handling, management and disposal of used lead acid batteries and also to ensure that the regulations regarding the cross border movement or sale of these batteries are being followed in Belize. Belize imported over 126,400 lead acid batteries between 2011 and 2014 so revitalizing a recycling program is no small matter.

Plastics to Oil

By Dottie Feucht

“Disposing of plastic is a global problem. Plastic comes from oil so why not convert it back to oil?” That’s what Japanese engineer, Akinori Ito, thought as his team set about to develop a machine to do just that. Plastic does not have to be broken down; it is put into the machine “as is” from garbage bags. The machine melts the plastic which becomes liquid which is passed through water. The result? Same as refined oil from which the plastic was made. 1 kg plastic = 1 liter of oil that can be used as fuel. “Waste is a treasure,” Mr. Ito emphasizes as he demonstrates his machines to school children who eagerly collect plastic waste for his machine. He estimates that this process, used globally, could reduce 80% of CO2 emissions.

Check this United Nation University project at the link below.
https://www.youtube.com/embed/qGGabrorRS8?rel=0
The Sugar Industry Management Information System (SIMIS)

SIMIS, initiated at the Sugar Industry Research and Development Institute (SIRDI) headquarters in Buena Vista Village, Corozal District, currently holds one of the largest agriculture databases in Belize. It includes soils data from the Belize Sugar Cane Farmers Association (BSCFA), weather data, field data and pest (frog hopper) monitoring data. SIMIS is being developed as a collaborative effort among sugar industry stakeholders in northern Belize with funding from the European Union through the institutional strengthening project of SIRDI. Project implementation includes two phases:

Phase 1:
- Development of a cane parcel database
- Development of a farmer identification (ID) system
- Establishment of a governance and management framework

Phase 2:
- Building of the SIMIS infrastructure
- Development of a cane estimate process
- Design and implementation of a harvest management system
- Development of related proposals (Aerial, Photo etc.)

Based on an estimate of approximately 79,000 acres of cane fields in the sugar belt, system personnel are currently conducting a sweep of the sugar belt to validate this data. Data collected and verified includes owner of cane fields, variety planted, age of cane, condition of cane field and a production estimate. As of April 2015 approximately 47% of cane fields have been verified; preliminary results show that the three most dominant varieties are B79474 (54%), B52298 (21%) and mex69290 (5%). From this data it can be clearly seen that effects of pest infestation on the most dominant varieties can have detrimental effects on the sugar industry of Belize. It can also be seen that effects of climate change and change in weather patterns can also have impacts on varieties, especially those that cannot adapt to extreme dryness or wetness. The anxiety and expectations of industry stakeholders has risen with the data verification and validation process.

SIMIS is also about to launch a farmer ID card and database system that will be centralized, standardized and accessible by stakeholders across the industry. ID database will be linked with the cane parcel database when completed and a portal will be used to link all cane fields with respective farmers. This in turn will be used to develop the SIMIS database and infrastructure that will be used to monitor cane harvesting, programing and delivery at the mill. All data collected is placed in a geographic information system (GIS) database which is being stored at the SIMIS datacenter. SIMIS and SIRDI technical teams have provided all data collectors with necessary training and capacity needed to collect field data. SIMIS technical team is tasked to provide reports and all necessary data mining required by the industry. SIMIS has also conducted specialized training in use of data collection hardware, software and applications including those to monitor real time weather data.
Luciano Sho
TCGA's Cacao Farmer of the Year
By Dottie Feucht

Based on his keen interest and support of Toledo Cacao Growers Association (TCGA), high producer of quality cocoa with excellent flavor characteristic, being a good role model and giving back to his community, Luciano Sho was chosen the TCGA farmer of the year in 2014. He inherited his father's 3 acre farm and expanded it to 21 acres where he cultivates at least six thousand five hundred cacao trees including Criollo, Trinitario, and Forastero varieties. Having attended cacao growers seminars in other Central American countries Luciano has shared his new insights and helpful information with other TCGA farmers. As with many TCGA farmers, Luciano ferments and dries his beans on his farm before they are taken to the TCGA facility in San Antonio, Toledo. He ferments them in cascading special boxes 3.5 – 4 feet high and dries them on long tables under roof.

Cacao beans are properly screened, bagged and sold in 125 pound bags with data identifying the farmer and dates of production. After arriving at the TCGA facility, the beans are tested for moisture and proper fermentation. Estevan Assi, TCGA’s compliance officer, is in charge of quality control and generally oversees the operation ensuring that quality for the markets are met. Using a probe, Pamfilo Edwards, the depot manager at San Antonio depot, checks each bag to make sure the moisture content is between 4 – 7%. Further tests are done with TCGA’s GEHAKA ISO 9001 certified moisture meter to ensure moisture content is accurate. Beans that have more than 7% moisture can get moldy. Proper fermentation is important for high quality chocolate. If beans are only 75% fermented they offer a mixed flavor profile that requires micro batch chocolate making. Good fermentation yields more chocolate, less bitter taste.

In 2014 85 metric tons of cacao were produced by Belizean cacao farmers, 47 of which came from TCGA farmers. Estevan says they are expecting 60 metric tons in 2015. Most of the beans are Trinitario but TCGA is experimenting with several combinations of grafts to develop a unique Belizean blend. Their research and development efforts are directed toward the best production, size of pods, number of pods and best soil.

TCGA buys beans in wet form for $1.10 per pound, dry beans for $3 per pound. Those that are bought wet are dried at TCGA facilities; they are turned by hand with big wooden rakes 4 – 5 times daily for 6 – 7 days. Bio-char is also produced there.

Justiano Bol, himself a cacao farmer, is the TCGA extension officer and has a full schedule assisting farmers with consultations, inspections, and other support services.

Editor’s note: For a comprehensive explanation of the services and organization of TCGA see Belize Ag Report, issue 8, page 1, written by Armando Choco, TCGA General Manager.
Purple Corn Possibilities for More Than Ixpaxa and Tortillas
By Beth Roberson

In August of 2014 the Belize Ag Report started a folder on purple corn, after noting the price for one pound on amazon.com - a stunning US$8.95. Eight months later, April 2015, the price from the same brand (barryfarm.com) on amazon has crept up to US$10.95/lb. The bulk (discounted) price on amazon from another supplier (Angelina’s Gourmet Purple Corn): US$55.40/25 lbs, and hold onto your hat, Natural Traditions Corn Powder, Purple, retails on amazon for US$18.42/3.5 ounces. What is so special about this corn to merit these astounding prices? Is the purple corn of Belize equally special, with export potential?

Many countries around the world – USA, Peru, Ecuador, Mexico, China, South Korea, Japan and Thailand are becoming interested in blue or purple corn varieties native to South and Central America, as they are unusually high in anthocyanin/flabophen content, which is linked to anti-oxidant quality. In a trial at Ohio State University, Asst. Professor of Food Sciences Monica Giusti tested anthocyanins from different plant sources (including purple corn, grapes, radishes, chokeberries, bilberries, purple carrots and elderberries), to see how much of each source of anthocyanin it would take to reduce cancer growth (lab grown human colon cancer cells) by 50%. Purple corn was clearly the winner in taking less of its anthocyanin to reduce cancer growth (lab grown hybrid Peruvian purple corn for chips, cornmeal, snackbars, cereals and cakes etc. can be replacement for synthetic Red Dye #40, they now grow hybrid purple corn for chips, commeal, snackbars, cereals and cakes etc.)

Time, field trials and lab tests will indicate the potentials for Belize’s purple corn. As an export crop, corn’s phyto-sanitary requirements are doable, and a consortium of growers could ease Belize’s purple corn. As an export crop, corn’s phyto-sanitary requirements are doable, and a consortium of growers could ease

<table>
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<th>Moisture %</th>
<th>Crude Protein %</th>
<th>Digestible Protein %</th>
<th>Crude Fat %</th>
<th>Acid Detergent Fiber %</th>
<th>Ash %</th>
<th>Total Digestible Nutrients %</th>
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<td>1.01</td>
<td>82.06</td>
</tr>
</tbody>
</table>
The IICA Focus in Belize

The Inter-American Institute for Cooperation in Agriculture (IICA) is focused on 4 central themes: family farming, resilience and climate change, value chains and inclusion and food security. IICA Belize has been working diligently at ensuring that our efforts reflect the needs of the country, taking into account IICA’s strengths, and the priorities identified in IICA’s 2014-2018 Medium Term Plan. Our priorities for 2015 will focus on selected value chains, continuing our work in support of the Sugar Industry Research and Development Institute (SIRDI), launching new initiatives to support the cattle and processing sectors, and providing additional support to the Ministry of Natural Resources and Agriculture in rolling out the new National Agricultural and Food Policy.

The March issue of the IICA Belize newsletter is now available online. The main highlights in this issue include:

- Message from IICA Belize Representative.
- IICA Assists the MNRA strengthen its Market Information System (MIS)
- CONACYT Scholarship experience in Mexico
- IICA and the OAS host Consultative Workshop

To read the individual articles go to: www.iica.int/belize or contact our office at: icabelize@btl.net or 822-0222 or visit our office at 24 Orchid Gardens, Belmopan.

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**CLEARING LAND? TRIMMING TREES?**

Look out for nesting birds!

- Avoid disturbing nests
- Replace fallen nests

**Found a baby?**

1. Featherless or not yet flying? Return them to the nest.
2. Lots of feathers? place them up high away from predators.

**Make sure** the parents are visiting.

If the parents are not around or your can’t replace the nest

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Jaime Vega
610-4174
jmvega_98@yahoo.com
The Associates Degree in Applied Agriculture

A Competency-Based Approach to Agriculture Training at UBCF

At the request of the Ministry of Education Youth and Sports (MOEYS), the agriculture program at The University of Belize Central farm (UBCF) has undergone realignment to make it more demand-driven. This initiative, known as CARICOM Education for Employment (C-EFE), is funded by the Canadian government, partner colleges of western Canada namely, Lakeland, Parkland, and Bow Valley, and UB. It is designed to link education to employment in preparing graduates for the workplace. The new curriculum focuses on knowledge, skills, and attitude development with training expanded to include significant workplace practice.

Students will be prepared for several career paths based on a recently conducted labor market survey undertaken by the college. Graduates of the new program are also eligible for direct entry into the second year of the Bachelor of Science degree of the University of the West Indies (UWI) at the St. Augustine campus. Two North American universities currently accept the degree for matriculation into their bachelor programs with exemptions for work already completed at Central Farm. The latter arrangements are to be strengthened and formalized in the near future. In addition, the revised program has a strong entrepreneurial component which will prepare graduates for self-employment opportunities in Belize.

The new Associates Degree program also focuses on adult training and skill upgrades in the workplace and is scheduled for rollout in August of 2015. It comes with significant upgrades to facilities, both field and laboratory, and a modular structure for the delivery of a lifelong system of training in applied agriculture. Students from both the traditional academic and technical/vocational educational streams are able to matriculate into the program which has the requisite student support services, namely, counseling, academic advising and career guidance for success. Expansions are planned for linking the program to the Caribbean Vocational Qualification (CVQ) framework during the first year of implementation and the inclusion of certificate programs for farmers and prior learners.

Additional information on the new program can be found on the Facebook page of the Agriculture College of The University of Belize and will be available from the office at Central Farm from the beginning of June.
BLPA’S AGM - A Rousing Success  
By Beth Roberson

An enthusiastic and positive group of approximately 80 ranchers from all over Belize converged at their headquarters at Mile 47 ½ George Price Hwy. on February 28th, for the AGM of the Belize Livestock Producers Association (BLPA).

Chairman Abdala Bedran opened the meeting with reports of a whopping 240% increase in cess collections, and healthy monthly accounting reports by Owen Codd. Chairman Bedran continued with good news for the Belizean cattle industry. BLPA has met with counterparts in Guatemala, the senior livestock officer for Peten and BLPA joined as a member and attended the meeting for Federación Centroamericana del Sector Cármino Bovino (Fecescabo) in Guatemala City. By aligning with Fecescabo, BLPA will enjoy their lobbying and marketing benefits. Beef prices here are almost the same as the rest of Central America. Fecescabo is working to harmonize phyto-sanitary and quality standards for our region. By becoming part of this Central American trading block, BLPA members will enjoy the same privileges. For example, if fellow member Nicaragua contracts to sell to the EU, Belize would be enabled for that as well.

The association is working diligently and closely with MNRA to vet legislation which will improve compliance with programs and unify the sector, so that all ranches will be playing with the same rules regarding the sweep and export. This will assist us for shipping directly into Mexico. A recurring theme from the day was, “Predictable markets come from legal trade.” Chairman Bedran thanked IICA for assistance with the Belizean Beef Quality Assurance program. BLPA’s new website, www.belizelivestock.org, is up with work in progress.

Minister Gaspar Vega complimented the industry for re-inventing itself in a strong business model. He noted the low disease incidence verified by the sweep, and that cattle prices have more than doubled since the sweep began. He urged ranchers to reinvest these windfall higher prices, planning for long term viability with improvements such as better genetics. He cautioned ranchers not to export too many animals, lured by the high prices, and opined that the transition to export meat will be a slow one. Minister Vega also warned that Belize needs to finish 5 full sweeps, and that records for traceability must be maintained so that Belize will not lose the hard won export certification. He ended with praise for BLPA’s new leadership.

Dr. Carlos Itza presented a report on the cattle sweep progress. In summary: 97,471 animals were tested in the 1st sweep, and 93,581 in the 2nd. The 3rd is under way now. Compliance certificates will be issued to ranchers after their 3rd sweep. Dr. Joe Myers spoke for Baha (Belize Agricultural Health Authority), endorsing Minister Vega’s report. He noted that the cattle industry had donors to help defray costs up to sweep #3, and that we need to be seeking ways to fund sweeps #4 and #5.

CEO Alistair Maepherson pointed out that 2014 had been a year of contradiction: much done but much left to do, and he warned against complacency. Income for BLPA has risen 300%, and cess collection is up 240%. He complimented the Willows Bank emergency holding facility, also the strong community cattle group from Willows Bank. The Belize Livestock Registry (BLR) has great potential, but at this time lacks the funds to do some of the desired services. He suggested a renewed membership drive, and finding new sources of revenue, such as auctions.

The day ended with election of 4 new directors. This year’s newly elected directors are: Elston Wade of Belize River Valley, Frank Rempel of Blue Creek, Albert Reimer of Blue Creek, and Dr Henry Canton of Stann Creek.

Many members claimed that this AGM was one of the very best ever for BLPA.

Cattle–One of the oldest Industries in Belize– Now one of the Agriculture Industries with a very exciting future Local and Export Oriented

Phone: 501– 822-3883
Seaweed: A Garden’s Gift from the Sea
By Karin Westdyk

While at the beach several weeks ago, I watched as workers from one of the resorts raked the seaweed along the shoreline back into the sea. The sea, naturally, washed it right back up onto the beach. I knew that seaweed could be beneficial to the garden, so I asked one of the workers to bag me up some and I brought it home for my kitchen garden. I even suggested to him that he could probably make a business harvesting the seaweed and selling it to organic gardeners. He seemed to like that idea and said that many people from his village in the south knew about the benefits of using seaweed in their gardens.

And, indeed, for thousands of years, seaweed has been used by coastal farmers in their gardens because it has a full range of properties to enhance the soil and benefit the plants. Seaweed supplies bulk material to condition the soil and it contains approximately 60 trace elements, as well as growth hormones and plant nutrients. It is anti-fungal and helps prevent many plant diseases. Imbalances in the soil, such as nitrogen deficiency, can be fixed by adding seaweed because it can balance the soil’s environment so that nitrogen-fixing bacteria are encouraged.

The sand and salt in the seaweed contain elements that actually benefit plants, so unless your soil already has a high sodium content there is no need to wash it before placing it around your plants. Seaweed should be applied directly on top of the soil rather than mixing it into the soil. Wet or dry, like a mulch, it can be strewn around plants, placed in rings around trees, or a small amount can be put into a hole where plants are being set into the ground. It can also be mixed into the compost pile. Because seaweed is not a cellulose-based plant like land plants, it will break down quickly releasing its wonderful soil amending properties and helping to breakdown other compost materials within the pile.

Some people prefer to make a “tea” with seaweed by placing it in a barrel or bucket with water (away from the house due to a strong odor), covering it loosely, and letting it steep for several weeks to months before applying it. A foliar spray deters pests, fungus and viruses as well as provides nutrients. The tea can also be used to counter the effects of “shock” when transplanting and is used on cuttings to help them establish themselves more quickly. The tea should be light brown in color, similar to regular tea, so water may have to be added if it is too strong.

Seaweed contains essential complex carbohydrates, iron, selenium, and iodine, as well as mannitol and alginic acid, both of which acidify the soil and help plants absorb nutrients. There are also natural plant growth hormones in seaweed that encourage chlorophyll production, germination of seeds, and healthy root systems. Seaweed hormones also increase the strength of plant cell-walls, creating stronger more pest-resistant plants with increased nutritional value.

As the ancients knew and many organic gardeners of today know, seaweed is truly a gift from the sea as it helps provide stronger, faster-growing plants that germinate quickly, building stronger roots, and producing sweeter fruits and healthier vegetables with higher yields that are more resistant to pests and disease.

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“One spike can produce between 180 and 220 flowers and there are usually about 80 spikes,” explained Marvin, staff member at Caves Branch, to the group of Standard 3 students from Valley of Peace School. He was describing the largest orchid in Caves Branch garden, the Shower of Gold (Oncidium sphacelatum). Incorporating math into their field trip, he asked the students to pick a number between 180 and 220; 211 was the choice. “OK, now, let’s estimate how many blossoms this orchid may have this year. Let’s multiply 211, the number of flowers each spike can produce, by 83, the approximate number of spikes.” Wow! 17,513 blossoms! In the first year, 2011, there were 4,576; each year the number of blossoms has increased. In 2014 there were 13,652.

The 22 students were divided into three groups, each rotating through the activities; so all three groups estimated the number of blossoms. Staff members David and Sayuri taught the students how to take field notes the way botanists do when they find plants in their natural habitat. The students chose a plant and determined its type (epiphyte-grows on trees; lithophyte (grows on rocks; terrestrial (grows in soil), carefully measured the distance from the ground the plant grew, wrote down the exact GPS coordinates, and examined the plant to note its characteristics. Each group took an herbarium with proper instruction for preparing and caring for it.

Staff member Mario led the students through the orchid house and nursery, explaining plant characteristics and identification procedures. In the afternoon the students had a painting session; each group was given a type of plant to draw/paint. Then, using index cards for notes, each group discussed what they learned and one person from each group presented the consensus.

Planting and caring for plants are not new to the students of Valley of Peace. Teacher, Rolando Cowo conducts their Garden & Environment Club, which combines science, math and economics. The students have planted over 200 plants, including edibles, ornamentals and lumber (teak, mahogany and cedar). The students are learning how to grow plants organically. Rolando tries to incorporate all aspects of gardening and agriculture including how to make a budget, determine costs and calculate profits. He is encouraging the students to continue their study of agricultural science. He noted that past activities have included animals. Students belonging to the 4-H program have raised pigs and some graduates continued their activity, expanding it into a business. That’s what he is hoping for his students. He would like to find donors for poultry incubators and young chicks so that the students can learn the poultry and egg business.

In addition to hosting students, Caves Branch has liberally donated plants to the school for their club; the grateful students created a plaque and presented it during their visit to Caves Branch. Mr. Rolando Cowo’s contact information is rcachrist@gmail.com; phone 653 3570.
Developing the Rice Industry in Belize: Establishing a ‘Culture of Rice’

By Beth Roberson

Commercial rice production in Belize has a relatively short history. Small farmers in the south produce rice; the larger mechanized Mennonite communities in the north and west produce most of the 21.6M pounds annual consumed in Belize.

At a Ministry of Natural Resources and Agriculture (MNRA) policy meeting in December 2013, the moderator, then IICA Country Representative Dr. Muhammed Ibrahim was asked, “What does Guyana have {regarding rice production} that Belize does not have?” He did not hesitate to reply, “Guyana has a culture of rice.” Years of raising a crop will eventually endow a farming populace with a “culture” of that crop. Until that time, the rice producers of Belize are doing their best to progress on that learning curve, while taking all the risks with which the agriculture sector is familiar, and of which the typical consumer is unaware. Look at last year’s drought up north, which drastically reduced production up there and created a shortage for the domestic rice market.

Prospective importer, Mr. Jack Charles of Extra House Imports, has requested, and been denied by MNRA, a permit to import 500,000 lbs of rice from Guyana. Guyana has had a bumper rice crop, and is doing all she can to export same, even to the point of disrupting a portion of Belize’s corn exports for animal feed (corn being replaced with cheap rice in some feeds).

As the Belize Agro-productive Sector Group (BASG) spokesman, CEO Dr. Henry Canton has pointed out, local retailers have had less risk and more profit, not just in rice, but with many Belizean agricultural commodities. One way that has been suggested for a way out of this dilemma is for farmers to create their own markets in every large town/city, where they could control the grading, packaging, weighing, and the pricing of their commodities. Farmers should be the ones controlling the quality of their products on the shelves. The rice producers, as with producers of other commodities, have established marketing networks. They should be allowed to have a part in rice imports, when necessary, to protect these hard-won networks. Many report that the quality of the Guyanese exported rice is inferior to our locally produced rice. That is certainly true with the international corn market; huge producer USA, when exporting to CARICOM, never sends the top quality product.

Will Guyana’s bumper rice crops and cheap exports continue? We don’t know. What we do know is that if Belize is to achieve food security, we should be growing the foods we eat, when we can, especially the ingredients for our national dish of rice and beans.

We look forward to reviewing MNRA’s forthcoming revised Standards for Rice. The Belize Ag Report has full confidence in MNRA’s ability to logically sort things out, protecting the invested farmers and also advocating for the Belizean consumer to receive high quality and good value rice.

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<td>Soya Beans</td>
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<td>Black Eye Beans</td>
<td>1,037,911 lbs</td>
</tr>
<tr>
<td>Corn (Yellow)</td>
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Organic Produce Available in San Ignacio Market

Pro-Organic Belize (POB), working with the San Antonio Cayo Organic Growers Association (SACOGA) is responsible for making organic produce available in the San Ignacio open air market. POB was formed as a group in November 2014 by a group of individuals who are committed to sourcing healthy food in Cayo by furthering the organic agriculture movement in Belize. The mission statement is “To support and promote San Antonio Organic Growers Association and other organic initiatives in Belize.” POB and SACOGA have been working with Central Farm Organic Division and Sustainable Harvest International to form a participatory guarantee system (PGS) with the farmers and customers to ensure that produce is grown using organic standards. The PGS concept embodies principles of co-participation by sharing responsibility while helping promote and ensure organic standards and integrity. On Earth Day, April 22, 2015 POB and SACOGA reached agreement on a formalized three phase transition to organic PGS.

International Federation of Organic Agriculture Movement (IFOAM) and United States Department of Agriculture (USDA) standards are guidelines to help shape a workable system suited to Belize. The goal is for Belize farmers and consumers to become educated about the benefits of organic agriculture using sustainable agriculture farming methods and growing food that is free of agro-chemicals. The motto of Pro-Organic Belize is: “Know your farmer, know your vendor equals safer food for Belize.” Some vendors at the San Ignacio Cayo open air market are featuring signs on produce bins, Grown in Belize using Agro-chemicals, Organically Grown in Belize, Imported using Agro-chemical making it easier for shoppers to make food choices.

There is now an easy way for consumers to purchase fresh organic produce at the San Ignacio Open Air Market on Saturday mornings. There is a growing customer base who have been pleased with the system of ordering fruits and vegetables by phone or e-mail and picking up and paying for produce from the SACOGA booth. To order produce for delivery to the San Ignacio Open Air Market on Saturday, please send an e-mail to cesarmesh@gmail.com or call Abdias Mesh, 674-8064. Once you are on the customer list, about midweek you will receive a message listing what produce is available and what the prices are.

POB and SACOGA meet in the San Ignacio area once or twice a month. Meetings are open to all who want to support organics in Belize. Send a message to Pro-Organic Belize proorganicbelize@gmail.com or call 677-9658.

Look for us at the National Agriculture Trade Show fair booth B83 on May 1st, 2nd, and 3rd in Belmopan and also find us on Facebook.

Earth Day, 22 April, 2015

From Pro Organic Belize Board of Directors:

“Earth Day Endorsement for San Antonio, Cayo Organic Growers Association”

Pro Organic Belize is pleased to announce the commencement of a formalized agreement between Pro Organic Belize and the farmers known as San Antonio Cayo Organic Growers Association (SACOGA) thus paving the way for full organic certification in the near future. Of special significance is the fact that the agreement occurred on Earth Day which is very appropriate as organic farming uses sustainable practices rather than destructive ones.

Essentially this agreement comes from a Participatory Guarantee System (PGS) which encompasses both these groups. All members of the PGS participate in an aspect of promoting organic practices, whether it be farming, or education. This agreement is an important step for Pro Organic Belize as a future organic certification body for locally grown and produced organic food in the Cayo District.

All over the world the question is, Who’s Your Farmer? Pro Organic Belize encourages you to know your farmer, know your food, and know your vendor. Personal relationships based on mutual agreement, and the integrity of those involved lead to a safer food supply for Belize. Pro Organic Belize is committed to a better informed public, and increased food security on a country wide basis. The signing of this agreement brings the nation of Belize one large step forward in the worldwide organic farming movement.

Look for Pro Organic Belize approved transitional farm produce in the Saturday San Ignacio market, under the SACOGA banner. There you will meet Abdias Mesh, founder of SACOGA, and the key element in the developing project. Also look throughout the week for vendors who display signs signifying “Belizean Grown- Transitional Organic endorsed by Pro-Organic”. Look for the Pro-Organic booth at the National Agriculture and Trade Fair May 1 – 3, 2015.
Enterolobium cyclocarpa, commonly known as guanacaste trees, are a sight to behold, sometimes dominating the landscape in a pasture or field, sometimes growing up through the jungle canopy in Belize and other tropical countries, often growing as wide as they are tall. There are some magnificent specimens on the outskirts of Spanish Lookout. Watch for massive trees with an expansive spherical crown covered with light to medium feathery green leaves in the rainy season. Trees often shed their foliage in the dry season. Guanacaste trees are fast-growing, leguminous evergreen trees with a broad shady canopy and generally grow from approximately 80 feet tall to as tall as 160 feet. Guanacaste translates to ‘ear tree’ in Spanish. The tree is also known as carocaro, Devil’s ear, earpod tree, parota, orejon, tubroosor pich. The names are derived from the unique fruits the tree produces – numerous pods which are approximately 3 to 6 inches in diameter. The pods are dark glossy brown when ripe with curious whorled, coiled, ear-like shaped, semi-circular discs.

Guanacaste trees provide shade and shelter to cows, horses, people, birds, lizards, ferns and numerous epiphytes, including several species of orchids, bromeliads, ferns and cactuses. Coffee plants grow well in the wide swath of shade under the trees. When the trees are in bloom, fragrant flowers are produced which are heavily visited by bees.

Guanacaste trees have been thriving in tropical regions of the world from the southern United States to as far south as northern Brazil and Venezuela for many centuries. Both Costa Rica and El Salvador share the guanacaste as their national tree. Other parts of the tropical regions have witnessed a decline in guanacaste trees due to deforestation for agriculture and cattle. They are tolerant of a wide variety of soil conditions and a wide range of rainfall. Generally they thrive in warm bright sun and moist soil but not in heavy winds or drought and do not grow well in areas affected by salinity in the air or soil close to oceans.

Close to Belmopan, at mile 47.7 on the Western Highway, is the fifty-acre Guanacaste National Park. The park was named after an unusual giant guanacaste tree, which was saved from being logged due to its twisted trunk. This famous namesake tree survived for many years until its demise a few months ago of ‘old age’. The gatekeeper at the park said visitors will not be disappointed in their quest to view a guanacaste tree as there are many more trees in various cycles of growth to be found in the park.

Plants easily grow from the seeds. Seeds must be broken or punctured in order for sprouting to occur. Many centuries ago, when large mammals fed off the pods, trees were easily distributed through digestion and by the creatures crushing the hard seeds with their hooves. Cattle and man are the primary means by which guanacaste trees are reproduced in recent centuries. Seeds remain viable for over a year on the ground and in the pods when they fall from the trees. With careful storage, minus excess heat and humidity, seeds remain at least 80% viable for sprouting for up to 11 years. Do not plant a guanacaste tree in your back yard, unless you have enough space and do not mind picking up branches after heavy wind conditions. Despite all the wondrous attributes of the guanacaste tree, some consider the tree to be a nuisance.

The cutting down of a mature tree has caused much dismay to guanacaste tree lovers everywhere guanacaste grows. However, guanacaste trees are rapid growers and can grow up to almost forty feet during its first year of growth. To grow a tree, locate some seeds and find a very large sunny growing area. Dig up the soil, then plant the cracked or punctured seeds about two inches beneath the earth and water regularly, especially in the first year of growth. Once mature, trees produce a prolific display of fragrant snowy white powder puff flowers, which usually bloom at the start of the rainy season. It takes the better part of a year after blossoming for the pods to develop, generally in time for the next rainy season. Trees are producing green pods this year in March through April in the Cayo district. The trunks of guanacaste trees grow strong and straight and are approximately 6-7 feet in diameter. The tree bark is light gray with vertical fissures which reveal the reddish brown wood inside. The water and insect resistant wood is valued to make light-weight dugout canoes, large vats for hulling rice as well as fine furniture. The bark extracts have been used for treating colds, bronchitis and to reduce fever. Gum from the bark can be used as a glue substitute or as a similar source of gum arabic. Tannins in the bark are sometimes used for tanning leather. Very young green guanacaste pods seeds are considered edible once they are boiled until tender. Fully grown pods have a soft but strong leathery feel. Seeds are approximately 1/3 inch with about 8-20 seeds in each pod. The seeds are hard, dark brown, rounded and are marked with a light brown or orange ring. Mature pods contain a sugary pulp which can be eaten raw or cooked. Seeds are also prized for jewelry making. Pods are a source of saponins which are used for soap making. Guanacaste seed flour contains 35% protein, which is three times the amount of protein in wheat flour. Most of the massive dropping of guanacaste pods remains unharvested under the trees. Seeds may become a food source once a commercial use is developed and marketed.

According to a web-site in Costa Rica, “The guanacaste tree is said to represent universal equilibrium, sacred creation, the renewal of faith, the power of Mother Nature and the transient condition of human life. It is a symbol of stability and growth. Strength from its roots to represent attachment to life. Its hard trunk expresses human will and its branches are the protectors of creative peace. The massive canopy is associated with spatial consciousness.”

loammarysusan@gmail.com please share article. Thank you.

Pictures courtesy Phoenix Photo
ASK RUBBER BOOTS

Dear Rubber Boots,

How can I save my bucket of beans and rice, prevent weevils and insects from hatching, until next year’s harvest, without using chemicals like phostoxin?

Hopefully,
Tired of Chemicals

Dear Tired of Chemicals,

Here are a few methods which you can either use independently or in combination.

1. Freeze the beans for a few days at or close to 0 degrees F. Then store in bucket with tight cover.
2. Add whole black pepper corns to the beans or rice.... Which then require sorting out before cooking.
3. Add a handful of bay leaves to the bucket. Rubber boots has successfully (no bugs) kept brown rice for about 6 months with just a handful of bay leaves.

Do you have some home methods for saving your grains – beans, corn or rice that you would like to share? Send them in please so we can share with our readers.

Submissions to Rubber Boots, questions, suggestions and also replies can be sent to Belize Ag Report, P.O.Box 150, San Ignacio, or emailed to belizeagreport@gmail.com

DEPARTMENT OF THE ENVIRONMENT

“When people put the environment first, development lasts.”

KITCHEN COMPANIONS

By Jenny Wildman

I used to think the Chaparro (Curatella americana) tree was a “garbage” tree until I discovered its many uses. Now I keep a jar of its pretty leaves in a vase on my kitchen window sill. It is called Chaparro as it has very rough leaves. It is nicknamed the sandpaper tree; its many uses include polishing metal and wood, arrow heads and the like. I use it to clean pots and pans. The young leaves are soft but grow more abrasive with age. The tree can be used to make charcoal and good for posts as termites do not attack it. Its tannin is used for curing hides.

The seeds are edible and can be added as flavour to chocolate. As a remedy for many conditions the infusions of leaves and seeds are applied topically or ingested. The flowers are very abundant in pollen so beneficial to bees and honey production. This is a wild tree that grows everywhere in Belize.

Also called sandpaper trees are the Ziricote (Cordia dodecandra) and the Geiger (Cordia sebestana). Leaves from both are used for cleaning pots. Did you know that leftover egg shells can also be used for cleaning pots? Egg shells have many great uses. If you need a little soap try the pod of the Guanacaste (Enterolobium cyclocarpum) tree. Break it in half and rub the pulp until it produces a lather good for washing delicates. The good thing about all these is that after use they get added to the compost and continue to be useful.

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DEPARTMENT OF THE ENVIRONMENT

“When people put the environment first, development lasts.”

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AG BRIEFS

Sub-surface drip irrigation (SDI) systems have bright future in helping feed growing world population.

Throughout the world currently, only about 6 percent of the land is under drip irrigation. John Vikupitz, president and CEO of Netafim USA, which sells SDI systems says, “This is sort of a bold statement, but we think flood irrigation will become a thing of the past throughout most of the world in the next 50 years. It’s simply not a sustainable practice. We have too many people entering the world, too many hungry mouths to feed and not enough clean water to drink. We’re undergoing a transformative time here where the convergence of environment, technology and culture are forcing change, and we intend to lead that change. It’s not just about producing drip irrigation components; it’s about teaching growers how to use them most effectively and how to maximize yields by using the least amount of water, the least amount of fertilizer, using the resources you have most efficiently.” Speaking at the company’s 50th anniversary, Vikupitz said that looking at the next 50 years the company sees drip irrigation continuing to grow as a water-saving technology. “We see tremendous potential of broad-acre crops like cotton, corn, soybeans and alfalfa,” he said. “But we also see technology such as advanced watering solutions become more popular with growers, and we see this as the next big step in agriculture.”

For more information on Netafim, visit http://www.netafimusa.com/subsurface

Is Colorado Primed To Become The Silicon Valley Of Agriculture?

In the last several years, Boulder and Denver have become hubs for tech startups, and companies in the state’s Front Range, patenting new technologies in irrigation, food science and plant genetics. Public scientists are keeping pace, publishing research articles in agricultural science in record numbers. That’s prompted local economists to predict that Colorado would become the “Silicon Valley” for agriculture. For example, a drone built by Agribotix, a Boulder startup, flies over a farm in Weld County, Colorado. The drone has a camera that snaps a high-resolution photo every two seconds. From there, Agribotix stitches the images together, helping the farmer see what’s happening in a field.

Colorado’s food and ag industries have been growing two to four times faster than the state’s economy overall. New neighborhoods in Denver and other northern Colorado cities are being structured around gardens, small farms and food hubs, taking the local food movement to a scale where it’s actually having a measurable effect on the city’s economy.

The Connection Between Central American Farmers and Deadlier Tornadoes in the U.S.

Scientists at the University of Iowa have recently published an article linking smoke from the burning of agricultural fields in Central America to more intense tornadoes in the US. Pablo Saide, post doctoral student at the University of Iowa and a coauthor of the study, said smoke drifting north from the Yucatán peninsula, which includes parts of Mexico, Belize, and Guatemala, changed two key conditions for the 2011 tornadoes. First, it lowered the height of the cloud base, which dropped 650 feet. It also changed the wind shear, which is a variation in vertical wind speed. Both conditions intensify tornadoes. Tornado season in the United States has grown deadlier in recent years, and 2011 was one of the worst, spawning 1,691 twisters. “Even without the smoke drifting up north, there would still have been an unusual number of tornadoes in 2011, but we found the smoke changed the parameters,” said Pablo Saide.

For Information on the status of the Iguana Creek Bridge

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

The Iguana Creek Bridge crosses the Belize River near Black Man Eddy Village, off the George Price (Western) Highway.
Tornadoes develop when warm, moist air meets cool, dry air, leading to instability that is compounded when the wind changes speed and height. This creates a horizontal spinning effect in the lower atmosphere, which gets pushed up by rising air into a vertical vortex and results in the raging tornadoes that occur during thunderstorms, tropical storms, and hurricanes. “If winds at the lower level where we live are about 10 miles an hour, for example, then the wind one mile from ground level would be twice as fast,” Saide explained. “Combined with lower clouds, this leads to higher chance of tornadoes and stronger tornadoes.” Smoke increases the number of aerosol particles in clouds, which makes them brighter and more reflective. Soot from smoke also interacts with the sun and absorbs radiation, which heats nearby layers of air. “Because of this, you get less solar radiation on the ground, which lowers temperature on land,” Saide said. “And the lower atmosphere is more stable, so together this brings the clouds down lower.”

The 2015 Chocolate Festival of Belize, will be held in Punta Gorda Town, Toledo District, on 22-24 May, over the Commonwealth Day holiday weekend. The theme is “Celebrating Belizean chocolate and Toledo culture”. For more information, call 722-2531 or email info@chocolatefestivalofbelize.com

On 20 March 2015 a landmark ruling was issued by the International Agency for Research on Cancer (IARC), the specialized cancer research agency of the World Health Organization. Their reassessment of 5 organophosphate pesticides included: “The herbicide glyphosate and the insecticides malathion and diazinon were classified as probably carcinogenic to humans (Group 2A).” In this same report, discussing the history of glyphosate classifications it was noted that in 1985 glyphosate was originally classified as “possibly carcinogenic to humans (Class C).” Then after some study re-evaluations, in 1991, the EPA changed its classification to “evidence of non-carcinogenicity in humans (Group E).”

Glyphosate is used in over 750 herbicide products. The 2010 Kristine Kaiser UCLA study, which monitored over 30 sites in Belize’s Mountain Pine Ridge Reserve over 3 years, found glyphosate in each and every sample in every location. She advised and encouraged further follow-up study, in areas closer to currently farmed lands. http://link.springer.com/article/10.1007/s00128-010-0167-x/fulltext.html

Regarding malathion, the IARC declared that “Malathion caused DNA and chromosomal damage and also disrupted hormone pathways”. On diazinon, “The classification of diazinon in Group 2A was also based on strong evidence that diazinon induced DNA or chromosomal damage.”

The US Center for Disease Control (CDC) recently declared that “Unfortunately, genetics has been found to account for only about 10% of diseases, and the remaining causes appear to be from environmental causes. So to understand the causes and eventually the prevention of disease, environmental causes need to be studied.”

http://www.cdc.gov/niosh/topics/exposome/
Soil Analysis...Continued from page 14

How many years have nutrients other than N-P-K been taken out by growing crops without being replaced? It happens more often than not and it can be costly to try and supply all the fields on a farm at once. At first glimpse what needs to be done to catch up from a lack of supplying certain nutrients can appear quite formidable in terms of costs. This is especially true when considering restoration of those nutrients that may not have been there in adequate amounts when the crops were first being grown. Unless you learn the benefits of what doing the right thing for the land will return, or whether it will more than repay what needs to be put back into it for restoring or building up land to its true potential, it will likely never happen.

You can start small and see for yourself! But the best answers only come if you start by correctly sampling the areas you intend to use for conducting the test.

The soil is the plants’ stomach. The life (or living organisms) in the soil makes such a difference if we take care to provide the proper environment for all of them in the process of growing needed crops and plants. Feed the soil and let the soil feed the plants. According to soil microbiologists each acre of soil has enough living organisms to weigh the same as an average sized cow. And those organisms reportedly take what they need before the plant does. Every soil has to feed the equivalent of one cow per acre before the plants can take up what they need to grow best. A program designed just to feed the plants will rob needed nutrients from the soil because it does not take into account the needs of all the other organisms that function to supply the full selection of nutrients for truly nutrient dense foods.

The real goal of this article is not to convince growers they should take more soil tests, but to convince them that taking and using a soil analysis for determining the true fertility needs of the soil is actually possible. And when properly utilized such testing will then be of greatest benefit only if the samples are collected correctly to best represent the nutrient values of each soil. And once properly collected then they can be profitably utilized to find and apply only those materials shown to be needed. And such testing will then allow the application of needed nutrients in the proper order, and the proper amounts of each needed material!

It all begins with a good soil test. The recommendations from that test are only as good as the sample that was taken to represent the soil in question. The better the job is done to take a proper sample, the better the results will be for the growth of the crops and plants being produced there. That is where the true value of good land and its production capabilities will be determined.

Editor’s Note: Neal Kinsey will be conducting a 3 day soil fertility workshop at University of Belize Central Farm on May 11-13. Look for more about that in our next issue.

TO THE EDITOR... Continued from page 5

Roundup was claimed to be biodegradable. (dis-information*) It was claimed to be no more toxic than table salt until they were fined by the State of New York and forced to pull that advertisement. Monsanto has spent millions in dis-information* to stop the labeling of any food that contains any glyphosate. GMO’s & Roundup have been forced into many countries through dis-information* and political corruption but all to the detriment of the people.

President Obama signed into law a bill that gives companies that deal with GMO’s and GE seeds immunity to federal courts. The bill states that even if future research shows that GMOs or GE seeds cause significant health problems, cancer, etc, that the federal courts no longer have any power to stop their spread, use, or sales. Why this law if it is safe? Use this Dropbox link: https://www.dropbox.com/l/aaB4j7FgQ5ddYZsOEt8et to learn about the recent studies on Autism in children, cancer, ADHD, birth defects, kidney disease and more.

“Mom’s Across America” encouraged tests and found glyphosate in mother’s milk. MIT scientist Stephanie Seneff stated: “At today’s rate, by 2025, one in two children will be autistic,” in the USA. “Moms across Belize” must be informed concerning toxic GMO foods for the sake of their health and their children.

Learn how an Amish chemical farmer became a real farmer again by a serious study of technology and helped form Advancing Eco Agriculture. And this is not sentimental ideology but true scientific farming methods that do not produce dangerous, unhealthy, and toxic food.

Those who continue to spread dis-information* will receive a reward. *(Revelation 21:8)

Professor Don Huber on glyphosate made this statement: “When future historians write about our time, they’re not going to write about the tons of chemicals that we did or didn’t apply... They’re going to write about our willingness to sacrifice our children...” *(For profit)

Pastor Tom McKinney

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