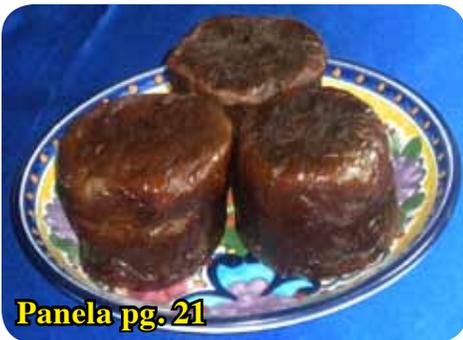
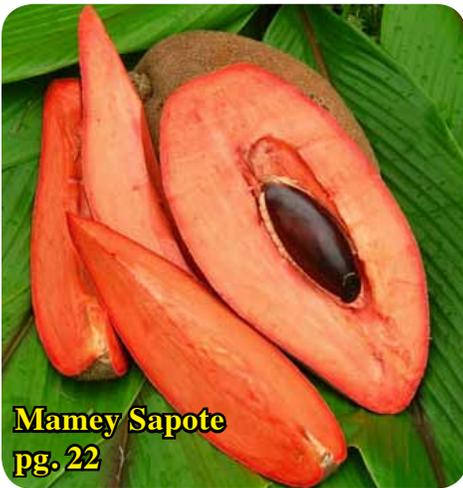
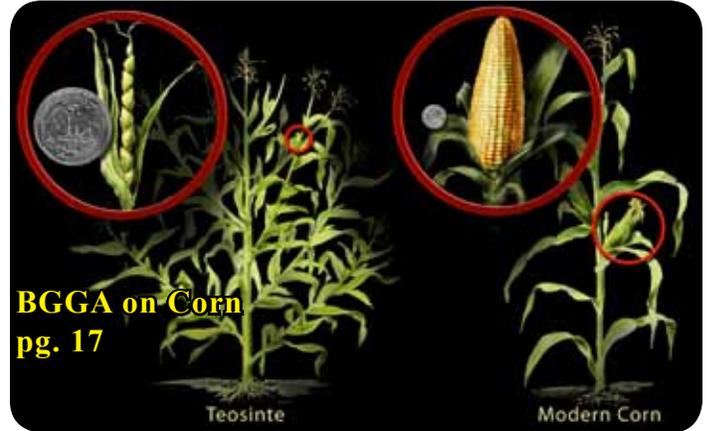


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Belize's 'Green Coal': The Multi-Purpose Cohune Nut

By Dottie Feucht

The cohune palm tree, *Attalea cohune*, familiar to Belizeans, produces a nut about 6 inches in diameter in huge heavy clusters, weighing about 100 pounds. One tree can have several of these clusters. The nuts have been used by the Mayas, and in more modern times, by other Belizeans for fuel and oil. The kernels are 65 to 70 percent oil, but they amount to about 6% of total weight. The nuts are unusually hard and difficult to crack and their collection and transportation can also be difficult; so commercial oil recovery has been relatively undeveloped. Peter Singfield, who lives in Xaibe, Corozal District, developed an oil extraction system using a conventional oil expessor.



First the nuts need to be heat treated to loosen the meat from the shell or they are impossible to extract. Properly heated, the nut falls from the shell when the shell is "properly" split. Peter used to set them out in the hot sun on a black tarpaulin for four days or so, where the mid-day sun on a black surface reached temperatures 145° - 150°F. Others boil them for 30 minutes, while some people make fire pits and after the coals are sufficiently hot, put in the nuts and cover them with soil to process the next day.

Cracking cohune nuts can be quite dangerous. It takes time and practice to develop that skill. After the nut is cracked it must be inspected for worm infestations; that meat makes bad oil. It is not unusual to have 20% of the nuts infected; that adds up to quite a waste factor in terms of labor, heating, cracking and weight yield reduction.

The resulting nut meat can go directly to the oil expessor for oil extraction. The process works better if the nut meat is first heated to about 140° F, but in Peter's process where they are passed through the expessor five times to extract all the oil, they get sufficiently warmed.

Peter, an engineer by background, further experimented with

cohune nuts. He built a stove to burn the nuts proving that the efficiency and cost are much less than butane. He's now refining the design of the stove using a bigger fire box for a more sustained burn and top draft burning, as they do for burning bagasse in the big cane factory furnaces, which will prevent pots from blackening.

The stove is called dual chamber because one cooks the fuel while the other burns the gas so released. In Peter's design both chambers are thick layered with refractory (material that retains its shape even when heated to high temperatures); the second chamber, the gas burning chamber, gets very hot and stays that way, which greatly increases ease of combustion and combustion efficiency. The secondary air is blown down on top of the fuel bed; the second combustion chamber, which is quite long, is on top of it. Cool air is forced down into the top burning pit (like blowing on a cigarette standing on end); then the swirling mixture goes up into the second upper chamber, which is red hot, and real combustion of gases occurs. Although it can work after being warmed up on natural draft alone Peter says he'd like to have an inexpensive Chinese hand-cranked blower for start up. He uses about 10 pounds of cohune nuts to start the stove. When he wants to shut it off he blocks the air flow. He is still experimenting to determine the length of time per quantity of nuts the stove can burn; however it appears that these stoves cook "clean" for 1/3 or less the cost of butane. An added benefit of using these stoves is providing work for many enterprising Belizeans who can sell/transport cohune nuts.

On the other hand, commercial production of cohune oil is so inefficient that it can be considered viable only if the nuts can be obtained free of cost.

Peter is not finished with his cohune nut experimentation. He's currently working on using cohune nuts whole for thermal energy.



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TO THE EDITOR

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

Dear Editor,

Biologically Appropriate Technology or GMO

Biologically appropriate technology is designed to do no harm to the environment – the air, water and soil. It is working with nature, not against it. It is learning from and respecting nature.

Having been an environmental journalist turned anti-nuclear/pro-renewable energy activist, I am seeing similar patterns in the debate over GMO corn as existed in the nuclear debate. The parallels lie in how the public was sold on nuclear power back when there was concern that nuclear power might not be “biologically appropriate technology.” Touted as being “safe, clean, and too cheap to meter” by the industries that financially benefited, nuclear energy turned out to be an expensive environmental nightmare, costing trillions, and many lives. Safely dealing with nuclear waste is still an unsolved problem; Fukushima is an ongoing out-of-control environmental disaster contaminating water daily with ionizing radiation that flows to the open sea.

When there is controversy regarding a technology, it would seem best to stay on the side of caution. So, we ask ourselves, is genetically modified seed (ie: GMO corn, etc.) biologically appropriate technology? Those who gain the dollars from having mass control over the world's food production view it as appropriate. Those who understand the Creator's command to “respect all that I have created” do all they can to stop GMO corn from tainting the perfect food given to us by the Creator. Genetically modified corn is designed to cross pollinate and then take over a species of plants, not unlike an invasive.

Those who will pay the higher cost in health, dollars, and labor will view GMO with a skeptic eye just as farmers across the globe who have regretted the day they planted their first GMO seeds – now tied even more tightly to a system that forces them to use their profits for the next crop's even greater needs for chemical remedies that destroy the soil and water, kill bees, birds, and other animals. Small farmers in India have committed suicide due to the havoc caused by planting genetically modified seed crops. As Dr. Vandana Shiva states, “Control over seed is the first link in the food chain because seed is the source of life. When a corporation controls seed, it controls especially the life of the farmer.”

Several examples of biologically appropriate technology for agriculture are: biochar -- an ancient custom of burning cleared-land plant material in special ovens or underground, creating a carbon-based soil amendment that serves the soil for hundreds of years, while keeping the carbon out of the atmosphere; simple composting; and using safe plant-based pesticides such as neem. Sustainable agriculture should be sustainable for the people – not the corporations who “modify/manipulate” a gift from nature for their own benefit.

We are the ones who must carefully research before deciding: do we keep Belize pure and free from the stranglehold of U.S. and multinational corporations, or do we allow it to be swallowed up by the tsunami of greed and “bad for the environment” technology that has negatively impacted so many other countries? There is a growing body of evidence to substantiate the huge problems others have experienced by buying into the sales pitch of Monsanto and Syngenta.

Karin Westdyk
Cayo District

Dear Editor,

Over the last 3 years I have been studying the subject of agriculture and at the same time experimenting with different methods of growing grains, fruit trees, herbs, and vegetables. The more I study and look at Belize's agriculture, the more surprised I am at the lack of knowledge of science and its relationship to agriculture in Belize.

The Belize Ag Report is the only local attempt to try and disseminate knowledge to Belizean farmers. So, readers please continue to support this newsletter.

Sincerely,

Bill Lindo

Dear Editor:

Great Stuff

Thank you for the great slick magazine! It really makes Belize look good here and abroad. A dentist friend in El Paso Texas to whom I sent 2 copies, mailed us a generous donation with the rave that <he never could have thought that Belizean agriculture could be so diversified.>

A caller to Friendship Centre to whom I lent another copy, refused to do anything but read it stating that he had never seen Belize Ag Report before.

Keep up the great work! Kudos! Raves!

Dr. Elsa Potter

Founding Coordinator, IICL

Friendship Centre

Dear Editor,

Thank you very much for the opportunity to express my views on the hotly debated and divisive topic of GMOs. While much accusations have been made against those in favour of GMOs, the anti-GMO lobby has gotten much more attention and publicity in Belize than the pro-GMO lobby. One of the primary reasons for this is that farmers are not known to speak out publicly as they are busy trying to sustain their livelihoods and feeding those who are not producing their own food.

In Belize, commercial corn farmers have decided that they want to use advances in modern biotechnology or GMOs to improve their production and address some of the many problems faced by corn farmers. GMO technology is being used commercially in the three (3) top corn producing countries, namely the USA, Argentina and Brazil, to control insect problems in corn and to improve weed control. More importantly is that promising results are being obtained by scientists who are experimenting with GMO corn plants that are able to fix or harvest its own nitrogen from the air, much in the same way that Red Kidney beans and soybeans does. Once commercialized, nitrogen-fixing corn will reduce the need for commercial nitrogen fertilizers and this will have a positive impact on the environment, including reducing its contribution to the greenhouse effect. Other characteristics such as improved nutritional content (eg. higher vitamin A, higher omega fats, higher quality protein etc), improved yields and the ability of corn to grow under very dry climates, or in very poor soils, are also being developed through GMO technology.

Continued on Page 26

Positive Changes In The Citrus Industry

By Fernando Majil, General Manager,
FreshWater Creek Farms, Ltd.

Email: fmajil@yahoo.com; Tel: (011-501) 667-7279

The Belize Citrus Industry was started in 1913 and this year marks its 100th anniversary. Congratulations! The industry has grown to be of major economic importance in Belize. There are now about 45,000 acres of citrus groves and the industry represents 4% of GDP, accounts for 22% of major export earnings, and directly benefits 10,000 people and indirectly 50,000 people.

The Belize Citrus Industry is facing many of the same challenges as other agricultural sectors including increased costs of fuel and fertilizers, global changes in trade with price fluctuations, natural disasters and climate change, and pests and diseases. The industry has survived many of these challenges. Today it faces an additional one: the devastating Citrus Greening Disease, also known as Huanglongbing (HLB). This disease is spread by an insect vector—the Asian Citrus Psyllid (*Diaphorina citri*). The disease is also spread from infected propagation materials in citrus nurseries.



Greening was confirmed to be present in Belize in 2009. Since then it has spread to many groves, mainly in the Stann Creek District, and groves are declining, many trees have died and some groves have been totally removed. This past year

witnessed a decline in fruit production up to 50% countrywide and Greening was a major factor.

The question is: how can the citrus industry in Belize survive and expand? Florida's growers have changed their growing practices because of Greening. Belize has relied less on pesticides than have U.S. growers, but one practice we have in common is the requirement that growers must start with clean, certified propagation material. All citrus plants in Florida

must be grown under controlled conditions. This practice is currently also required in Belize where citrus plants must be grown in a controlled environment and be certified by the Belize Agricultural Health Authority (BAHA) before they can be sold or planted. Under the Citrus Certification Program, BAHA, in conjunction with the Belize Citrus Growers Association (CGA), inspects the growing conditions at all nurseries and certifies the final product. This ensures that growers start with young trees that are disease-free: of Citrus Greening Disease as well as Citrus Tristeza Virus, Citrus Exocortis Viroid and Psorosis Virus.

Past practices saw citrus seedlings and grafting of plants being done in open fields. Seedlings would be planted directly in the ground or in large



plastic bags, grafted in the field and sold directly out of the growing beds. Not anymore! All aspects of growing citrus trees for planting must occur in protective screen houses with double entry doors so that no psyllids can enter. Seeds for the rootstock must come from certified sources, again to make sure they are pathogen-free and grown under controlled conditions. There is a debate over whether Greening bacteria can be transferred by seed, but nobody wants to take chances where it concerns a relatively small cost in the growing of healthy trees. Once seedlings have germinated inside a screen house, they must be transplanted into bags or containers inside the screen house's controlled environment. All other growing activities such as grafting, spacing, weeding, culling and sorting must take place inside the screen house where space is limited.



FreshWater Creek Farms, Ltd. (FWCF) is one of the first nurseries in Belize to be certified for growing clean citrus plants and is committed to bringing innovative and positive changes to

the citrus industry. We are changing to U.S. growing practices to increase the efficiency of growing plants. We are also in the process of expanding our certified citrus plants production and expect to produce 100,000 citrus plants which will be available for sale starting in December of this year.

Continued on Page 7

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

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

The Soil & Agriculture

By Bill Lindo

Agriculture as we know it has been with us for over eight thousand years. Science first became evident with the ancient Mayas, Peruvians, Persians, Egyptians, Chinese and Indians some two to three thousand years ago. These ancient peoples knew how to grow healthy crops with high yields and feed some 50,000 to 300,000 persons in cities with very good sanitation and running water. However, after the year 1,100 AD all this knowledge was lost to humanity because their civilizations collapsed.

It was not until the middle to late 1800's that Von Liebig and Julius Hansel both of Germany brought science back into agriculture with their works on soils. Then between the period 1930 to late 1950's two Americans, Professor Emeritus Dr. William Albrecht and Dr. Carey Reams leapfrogged the knowledge of soil science. In the late 1920's, early 1930's, Dr. Albrecht and his colleagues made the very important discovery in soil science, the role of the clay fraction of soil in cation exchange capacity (CEC) you see on soil tests. His published work is collected in 8 volumes by the late Charles Walters of Acres USA. It still stands as the greatest work in agriculture, yet Dr. Albrecht's name doesn't even get a mention in modern soil science textbooks.

It reminds me of Nikola Tesla, Kary Mullis, Phil Callahan, and Linus Pauling. Tesla gave humanity our entire worldwide electrical system; Mullis gave us the polymerase chain-reaction that is the foundation of all DNA; Callahan gave us how insects communicate, para-magnetic soils for super growth of plants, and physical proof of the connection between tachyons, magnetic monopoles and the beauty of photosynthesis; and Pauling was the father of modern chemistry. A writer said that because Pauling and Mullis both won Nobel prizes, the million dollars took a bit of the sting out of being shunned by the textbook writers.

Dr. Carey Reams' great discovery was the energy balance or imbalance of the soil – the flow of energy in the soil. He was always telling students about the “dead battery” in the soil. Both Drs. Reams and Albrecht taught that the foundation of all soils is calcium and phosphorus. Calcium must be at least 2,000 lbs./acre, and phosphorus must be at least 175 lbs./acre for healthy soils (on the LaMotte soil test). Reams, because he lived and worked in Florida which has vast phosphate deposits, was able to do a lot of experiments with phosphorus. Even today, we don't know much about phosphorus in the soil. For instance, we do not know why phosphorous, an anion, does not leach like other anions such as sulfur or chlorine. The little we know is from the work of Dr. Reams and his students. Main-stream agriculture knows next to nothing about phosphorus because it cannot help very much the bottom-line of big corporations. The mind-set of the school teachers, their publications, and of the corporations are based on what we call the “ash-mentality”. They take a crop, burn it to ash then measure how much of the elements such as nitrogen, potassium, phosphorus, sulfur is in the ash sample. This simplistic method forgets that nature is not linear. Phosphorus by weight is always necessary in equal amounts with potassium, but because it cycles, an ash test cannot give a correct indication.

Belize has a severe shortage of phosphorus in most of its soils. Dr. Reams discovered that the only economic way to build phosphorus in soils is with soft rock phosphate. If a farmer has a wad of money the other source of energy he/she can use to build the soil on his/her farm is MAP. All the other chemical energy sources cause problems in the soil of the farm.

We know about calcium because of the experiments and visions of Albrecht and Reams, namely, that the lack of calcium is a major cause of insects, weeds and disease

pressure on crops and trees. We also know that the calcium to magnesium ratio is very important. This very important knowledge farmers obtain from the petroleum engineers, geologists and geo-chemists of the oil industry. They were always drilling holes full of clay, mud and water. They discovered that the stickiness or non-stickiness of the soil was mostly due to the Ca/Mg ratio of the base saturation, the exchange capacity of the soil. This ratio should be about 5:1 for light sandy soils, and 7:1 for heavy clay soils.

Prof Phil Callahan's discovery about the secret of growth of plants and its connection to tachyons, magnetic monopoles and God's wonder of photosynthesis is a difficult subject even for most scientists. The Belizean farmers' interest is how they can use his theory to enable them to grow a healthy – quality and bountiful – high yielding crop economically.

The Belizean farmer must understand that his farm **MUST** have five essentials for good soil. All five are absolutely necessary. Nature is precise. First, the soil must contain energy. It takes energy to break-down limestone. A fertilizer's job is to provide energy, **but it is important not to use fertilizers that harm or kill the soil.**

Second, the soil must contain the foundation minerals, calcium and phosphorous. Nature has given the farmers very few soils with adequate levels of foundation minerals. Commercial fertilizers cannot supply the foundation minerals economically and they may kill the soil. The sources to mineralize the soil with foundation minerals come from crushed limestone, soft rock phosphate, and sometimes gypsum.

The third essential of soil mineralization is humus and biology. All soils must live and breathe. A dead soil produces dead foods that cause malnutrition in animals and humans. Products that keep a soil alive include manures, compost, humates, bio-stimulants, and enzymes.

The fourth is the trace elements such as nickel, iodine, cobalt, etc. Supply of these are from sulfates, various rock powders, chelates and sea minerals.

And finally is the para-magnetic properties of the soil. As Dr. Callahan discovered, this is the source of growth in plants. Soil once had these properties but rain and irrigation depleted it. Rock dust is an easy way to replace this magic element in the soil.

Once a farmer has enriched his soil with these five essentials, he will grow top quality and quantity produce, and the consumers of that food will need not worry about diseases associated with malnutrition – heart disease, cancer, diabetes, arthritis. How much sense does it make to use drugs and surgery to treat malnutrition?

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**“Feed the Soil”
Theme of 2013 Organic Fair**

The old method of slash and burn for farming is being replaced with slash and mulch by the farmers in Toledo and Stann Creek who have seen the dramatic increase in corn crop yields in side-by-side field experiments. The results of the experiment reported at the 5th annual Organic Fair held in Punta Gorda on October 25 and 26 also included increases in organic matter, water retention and carbon content of the soil based on soil analysis before and after the experiment.



The theme, **Feed the Soil**, was emphasized by every speaker at the event including Mr. Burton Caliz whose organic farm was toured by the attendees. In addition to mulching, the soil in southern Belize is being enriched by reforestation (223 acres), cover crops, and “alley” cropping (growing crops in between rows of trees e.g., Inga Edulis, Madre Cacao, and Leucaena, which are pruned regularly to allow exposure to sun). Mucuna beans are advocated as the primary cover crop, which can add as much as 30 tons per hectare of organic matter to the soil. Crop rotation, composting, and integrated pest control using organic ingredients and methods were also described.



Sustainable Harvest International - Belize (SHI-B), primary sponsor of the event, awarded many useful farming tools and magazine subscriptions which were donated as prizes to the farmers of the year: Michael Castillo from Stann Creek (whose son Fred accepted them on

his father’s behalf), Pedro Teul from Toledo, and Merceda Pau, youth/female farmer of the year.

Citrus...Continued from Page 5



In the States all citrus liners (small plants) are grown in containers on tables rather than in bags to reduce labour costs. Although FWCF grew its first certified citrus plants in traditional bags, we now place the clean seeds directly into small 2” x 8” deep plastic tubes on tables.

These can be sorted on size and quality allowing bad plants to be easily screened out. The smallest seedlings are transferred to special 4” x 14” deep plastic citrus pots. These pots are also grown on specially constructed tables. They can be easily sorted, moved, grafted and spaced. When the plants are ready they are sold in their pots (with a refundable pot deposit). Another advantage of

using this system is that loading, unloading and placing in the fields is much faster. One worker can easily handle two to four plants at a time and delivery trucks can transport at least three times the normal number of plants.



There can still be a bright future for the Belize citrus industry but positive changes must occur—from growing the healthiest plants in the nursery to carrying out the best management practices in the grove. In view of the challenges presented by the Greening disease and the other contemporary challenges of growing citrus, many traditional practices must go. It’s time for change!

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BEYOND THE BACKYARD

A Grain of Truth

By Jenny Wildman

We have become used to the labels *fat free, sodium free, cholesterol free, nut free*; now *gluten free* seems to be the latest trend. On the one hand we realize that the food industry is a business; so selling the idea that you need or suffer from something is inevitable. On the other hand we must consider the fact that incorrect labeling or secret ingredients for some people can become a matter of life and death.

At a recent cocktail party two people said they were allergic to shrimp, one to oysters, two to nuts, one is lactose intolerant, one to the polymers of surgical gloves and four out of the ten were on gluten free diets. One may have celiac disease and the others were advised to try avoiding **gluten** the sticky protein **found in wheat, barley, spelt, kamut, triticale, malt and rye**. They reported that they felt so much better in many ways, regained a waistline, thought more clearly and eliminated joint pain. Other gluten related conditions such as gluten ataxia can affect the brain and create neurological problems. A gluten free diet has been found to be useful in the treatment of autistic children. Even products such as shampoo and body wash can contain wheat germ, barley or rye and since the skin is the largest organ of the body it could be adversely affected. Surprisingly cigarettes may also contain gluten either from plant contamination or from the wheat processing of the papers.

Gluten was discovered by Buddhist monks seeking supplemental protein for their vegetarian diets. It is very useful in baking, providing elasticity and stability. It is used as a thickener in many processed foods including imitation meats and self basting poultry. Anyone handling food should understand the dangers, pain and discomfort that can be inflicted when a known allergen is ingested by the unsuspecting recipient. Cross contamination can occur on restaurant or home kitchen work surfaces and care must be taken not to mistakenly add an unwanted ingredient.

If you suspect you may be gluten intolerant try eliminating all gluten for three weeks and see if it makes a difference. If you have been diagnosed it does not mean you must avoid all grains and starches.

Here are some that are GLUTEN FREE for true....

Amaranth was the sacred food of the Aztecs. Its small seeds must be cooked - not eaten raw. There are many plants in this family, callaloo being one and pigweed in the USA another. It is a hardy crop that is easy to harvest and has multiple uses. It contains more protein than many grains, vital nutrients and is easily digestible. This plant is gaining a lot of notoriety as an answer to world hunger. I like to cook a variety of grains together for a nutritious mix.

Arrowroot is a starch made from the tubers of tropical plant *Maranta Arundinacea*. It has been widely cultivated everywhere the Caribs settled and it was brought back from the colonies where we Brits developed a fondness for its mild taste in little biscuits along with afternoon tea. Makes a sort of bland cookie often given to infants and invalids but since it is all carbohydrate it does not offer much nutritionally. It is a good thickening agent for sauces and pies.

Buckwheat. Russia and China are the leaders in the buckwheat field. It is a fast growing cooler climate plant related to sorrel,

not wheat as its name implies. As a flour it is used for noodles and pancakes and as a grain prepared like rice. It is possible to be allergic to buckwheat.

Cassava is a good source of carbohydrates in the tropics and throughout the world but lacking in protein and other nutrients. It must be prepared properly as it contains cyanide.

Chia (*Salvia Hispanica*) is from Southern Mexico and Central America part of the mint family. Excellent brain food which can be eaten whole, milled or sprouted. I am sure you remember the chia pet.

Chick peas or garbanzos are rich in protein and can be made into flour called gram used for baking or battering.

Corn or maize appears to have developed from the wild Mexican grass Teosinte. Cornmeal is a healthful and popular ingredient for gluten free cooking.

Flax seeds can be added for micronutrients, omega 3 essential fats and fiber.

Hemp seeds provide good fats to the diet, are rich in vitamins, minerals, essential amino acids, have a pleasing nutty taste and appear to be allergen free.

Millet has a very tasty nutty flavour and quick and easy to prepare. I used to give this only to my budgerigar George until the discovery that it was not just for the birds.

Oats. Although gluten free in their pure form oats are often grown on the same land as wheat and can have cross contamination there or in the processing facility.

Potatoes. There are many varieties and potato flour is a great alternative to wheat.

Quinoa comes from the Incas in the Andes; this plant has edible seeds but is not a grass and therefore not a grain. Thought to have magical power, chenopodium was banned from growing by the conquistadors. This is currently a very popular product.

Ramon, breadnut or Maya nut comes from the stately yaxox tree and is a very versatile food for humans and jungle creatures. It can be sun roasted, boiled, mashed, baked, used as flour for tortillas etc. or consumed as a beverage. It is a great vitamin rich survival food widely used in the Peten. It is part of the Maya rainforest garden and therefore not exposed to pesticides and chemical fertilizers.

Rice - brown, white, long grain, short grain, basmati, jasmine, wild rice, red rice - all are considered gluten free. (The term glutinous rice just means it is sticky when cooked therefore good for sushi. It does not contain gluten.)

Continued on Page 9

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A Grain of Truth... Continued from Page 8

Sesame seeds can be added for additional value and taste.

Sorghum. I bought some of this the other day in a feed store for my chickens. Grain sorghum is also called *milo* but not to be confused with the drink MILO which is actually processed from barley and wheat and therefore contains gluten. Sorghum is consumed by humans in many countries and principally fed to livestock in USA. It grows very well in hot climates. As a grain it takes longer to cook but it is nutritious and delicious. Sorghum is the main ingredient in gluten free beer.

Tapioca is a starch derived from manioc or cassava roots. Tapioca pearls may look like grain but are created by pushing the starch through a sieve under pressure. I would avoid the processed pearls and stick to real taro root.

Teff. Ethiopia is known for its long distance runners and they attribute their health and ability to teff, also known as lovegrass. This really is true and because of its versatility and proven track record is gaining popularity in USA. So it is out with the pasta; bring on the teff.

We do not know if allergies have risen because of change in seed and chemicals but the USA statistics say 1% of the population has celiac disease and gluten intolerance affects 10% of the population and if undiagnosed the problem can lead to gastrointestinal and other malignancies. So it is no wonder there is a trend to seek alternatives. Farmers are recognizing this and moving to gluten free crops to deal with the growing demand. Most of these products can be found in larger grocery and health food stores. I have found most of them in a health store in Belmopan.

Check the label first; if it says emulsifier, starch stabilizer, artificial flavouring or colouring it possibly contains gluten. Even if you are not on a restricted diet it is good to try new foods, give your body a

break and it helps to be better informed if a loved one develops an allergy. For gluten free foods you generally cannot go wrong with beans, seeds, nuts, eggs, dairy, meats, fish, poultry, fresh fruits and vegetables.

Here are **foods that can contain gluten** and for some should be avoided: on the menu -anything that says crumbed, breaded or battered; sauces as they are often thickened with flour; pasta; salad dressings; canned soups; baked beans; hot dogs and sausages; imitation meats and fish; hamburger patties, which often contain bread crumbs; roasted coated nuts; frozen french fries; sweets and candy bars; malt; some brands of baking powder but you can make your own gluten free with a combination of baking soda, cream of tartar and cornstarch; seasoned rice in packs; ice cream (but check ingredients; skip the chocolate chip cookie or cheesecake; go for lemon or vanilla); couscous which is wheat; orzo pasta which is barley; semolina which is wheat; soy sauce, which is made 50/50 soy and wheat (so look for Tamari sauce instead and check label for gluten free); Hoisan sauce; Worcestershire sauce; beerBUT one can find gluten free beers. (Alcohol is fortified with brandy or caramel colouring which contains gluten.)

Eggs are gluten free but if the chickens are fed a diet of wheat, it is possible that a very small trace of gluten could be present. We have seen eggs saying soy free so perhaps gluten free will be next. If eating eggs in a restaurant consider also that they may be cooked on same griddle as the pancakes.

The word **free** has many connotations and is grossly over used in marketing, often making us skeptical of its validity. Would you believe that the word **free** has its roots in a word meaning "to love"? Hopefully by understanding our friends' needs we will do just that.

For information you would like to share you can reach me at spectarte@gmail.com

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Agro-Processing Project Review

By Dottie Feucht

Agro-Processing, one of the four core projects of the Technical Mission of The Republic of China (ROC) (Taiwan), begun in 1999, held its annual meeting on September 6, 2013 at the pavilion of the National Ag and Trade Show (NATS) grounds in Belmopan. The project, which is funded by the International Cooperation and Development Fund of the ROC (Taiwan) ICDF, is headed by Mr. Carson Huang, who recounted project activities including (1) making almost 800,000 dried fruit snack packs (from over 400 tons of rejected export fruits: pineapple, banana, and papaya) that supported the school lunch program in Belize 2006 to 2010, (2) organizing and training over 21 groups (over 600 women) that have been formed throughout the country over the last 7 years, (3) developing training for vocational schools, called TVETs, (food science lectures and practice courses) for over 420 students in 5 districts: Cayo, Orange Walk, Corozal, Toledo and Stann Creek, and (4) initiating and technically supporting products, some of which were on display at the meeting: potato flour, crystallized ginger, pineapple yogurt jam, dehydrated mango, and the very successful soy sauce which is produced by the women's groups in Orange Walk and Corozal. The coconut and mango popsicles served for a snack to the attendees were really appreciated on the hot day. In addition, sweet potato rolls, made by one of the groups, complemented the traditional Belizean lunch.



Mr. Carson Huang

Mr. Fernando Yeh, Head of TTM, expressed the goal of turning over the project to Belize by the end of 2013. Mr. Henry Fan, Counselor, ROC embassy, encouraged the participants

to make plans to export the products to other countries in CARICOM. The export of soy sauce is planned for 2014. Mr. Gareth Murillo, Registrar of Cooperatives, encouraged participants, emphasizing that the government of Belize wants to help people who want to have their own businesses. He outlined support to the entrepreneurship program with links to the appropriate government agency for safety standards, food handling, organizational structure, marketing and exporting.

TTM does the training and technical assistance with help from extension officers. Mr. Belarmino Esquivel, Director of Extension, Ministry of Natural Resources and Agriculture (MNRA) reiterated that support in his welcoming remarks. Collaboration between MNRA and TTM has resulted in building facilities such as (1) the food processing multi-purpose facility at Central Farm research center in 2009 (2) dehydrated fruit processing facility at Corozal and Toledo, 2006 and 2007, respectively; (3) an application biotech laboratory for food processing at Central Farm research center in 2012. The lab is used for developing and providing the cultures, bacteria or other microorganisms - source ingredients for specific products with market potential. As products are developed the lab will provide technical assistance for each step of the manufacturing and export process.

According to Mr. Huang, the products of the project are chosen by combining willing workers with entrepreneurial aspirations and resources available in the geographic areas of the group formations and enterprises. Besides the products on display at the meeting are others: jams, hot pepper sauces, ketchup, cassava powder, soy bean milk, bread and cakes. These and other products are chosen and made in various local food factories by community women's groups all around the country.

Vocational training spans college and university levels with food science and information technology classes which are divided into specialized courses of study: food preparation, safety, hygiene;

Ms. Faye Garnett



basic food chemistry, food additives; dairy science, dairy product research; food fermentation. Students also have practical training making products such as yogurt jams, agro-instant powder (cacao instant powder), soy bean products and preparing restaurant food and beverages. The focus of vocational training is to match employment requirements more directly.

Future plans of the project include upgrading the community income program with web sites of agro-processing information and recipes for the women's groups and continuing the support of soy sauce production with technical assistance and help in obtaining HACCP certification prior to exportation. Belize could well be the producer of the first soy sauce brand in the CARICOM market!

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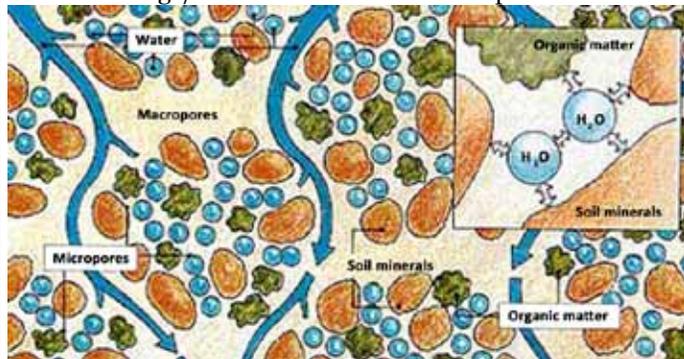
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No Hormones No Preservatives

Soil Structure, Strength and Consistency

By Harold Vernon
(e-mail: hmvernon@yahoo.com)

The major objective in preparing the soil for the cultivation of any crop is having good soil preparation as the medium for plant growth. We can have good soil and make it poor as well as poor soil and make it good. Aside from the fertility which is a measure of the chemical nutrients, we need to create favourable physical conditions for the plants. These conditions are consistency, soil strength and soil structure. These three characteristics of good soils allow the presence and movement of air and water in the soil as well as provide sites for storage/release of nutrients for the plants. Good soil



structure creates a good environment for the holding of water and air in the soil. Ploughing, harrowing and other forms of tillage are merely the mechanical means for the creation of these favourable soil conditions.

We refer to the chemical or mineral makeup of the soil as the **consistency or soil texture**, that is, the amount of sand, silt and clay that are the inorganic constituents. Soil texture is the commonly associated term for the 'feel' and includes soil properties such as friability, plasticity, stickiness and resistance to compression and shear. Pedogenic *slickensides* are convex-concave slip surfaces that form during expansion/contraction in expansive clay soils such as vertisols or heavy clay, limestone derived soils. We refer to soil consistency by its principal limits; the plastic limit is the moisture content at which soil consistency changes from friable to plastic and is the minimum moisture level at which a soil can be puddled or cultivated when very wet. The liquid limit is the highest value of the water content at which soil cohesion is so reduced that the soil mass will flow when force is applied. It is similar to the sticky point which is the water content at which a dry soil, when slowly wetted begins to adhere to a dry surface. We have all experienced soils sticking to shovels and implements, a nightmare of clogging when mechanical disturbance is attempted.

Mechanical disturbance of the soil seeks to breakdown the larger soil clumps or masses into smaller units or **ped**s. A good ped is that unit of soil that is of an appropriate size to have an optimized rooting medium featuring microstructures and micropores. The size, shape and stability of the peds and their capacity for being penetrated by air, water and roots are the foundations of soil structure. **Soil structure** is a very important consideration in growing crops and is not only a function of the physical makeup of the soil but also the chemical makeup. The chemical makeup is a direct result of the parent

minerals that compose the rocks. Softer minerals weather faster and come to predominate in the mineral composition of the soil. Limestone is a comparatively soft rock and is formed from the shells and bones of animals. Limestone also dissolves and reforms, leading to soils that have a high pH and too highly dense structures. **Soil strength** is the capacity of the soil structures to be held together due to internal forces and their resistance to being broken up, being forced together, incorporating water, all of which affect the soil density.

There are several influences that affect soil structure. The first and most important is the amount of clay present. In general, the more clay there is, the more stable the structure. Sands tend to be loose or very friable while silts form thick, impervious caps. Previous articles have discussed the important influence of organic matter. Cementing agents such as iron oxides often produce very stable structures. Better developed, more stable structures are associated with free calcium carbonate or gypsum. Good drainage assists structure formation although structures are more mechanically stable when drier. Excessive and/or prolonged drying such as occurs in droughts can result in breakdown of the structures resulting in loose topsoils, sandy or silty textured soils, or a hard surface or capping in high clay content soils. What does all this mean? (1) soils with appropriate amounts of sand, silt, clay and organic matter produce best results; (2) soils should be prepared with a fair level of moisture; (3) overworking by excessive tillage can destroy the structure formation and capacity of the soil; (4) ignoring the key roles of air and water reduces yield; (5) always seek to incorporate organic matter.



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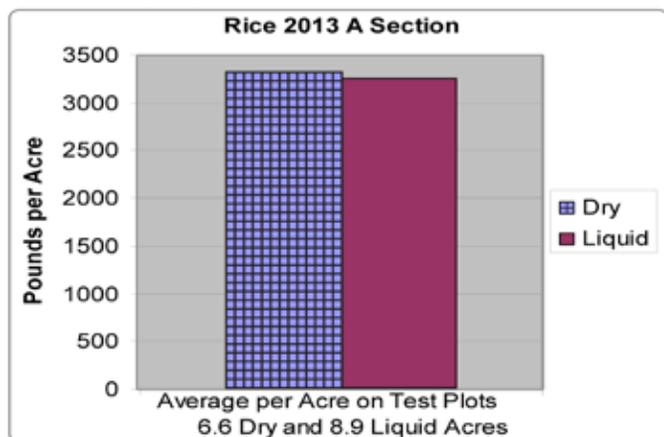
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Thiessen Liquid Fertilizer's Rice Trials

Rice production is expanding in greater Spanish Lookout and Cayo District, with almost 4,000 acres currently under cultivation by the Mennonites. Thiessen Liquid Fertilizer ran trials comparing rice qualities, costs and yields between crops grown with their liquid product versus those receiving traditional dry fertilizers. 6.6 acres received dry and 8.9 acres received Thiessen Liquid.



As shown in the chart below the rice receiving Thiessen Liquid did better in 3 ways:



	Dry	Liquid
Pounds per Bushel	36.3	38.1
Moister	24.80%	21.30%
Fertilizer Cost	\$310.41	\$289.15

1. There were more pounds per bushel. (Corn is measured in 56lb bushels; soy in 60 lb bushels; and rice bushels are measured by volume not pound.) The rice which received the dry gave 36.3 lbs/bushel, whereas the rice which received the liquid gave 38.1 lbs/bushel. The increase in weight indicates a heavier, higher quality grain.
2. The moisture content of the dry was 24.8%, whereas the moisture content of the liquid was only 21.3%: another win for Liquid.
3. The fertilizer cost was also a winner for Liquid, with dry at \$310.41/ac and Liquid at \$289.15/ac.

Dry pound yield per acre was 3,325 for the dry fertilizer and 3,251 for the liquid fertilizer. Nevertheless, Liquid's heavier grain yielding the heavier bushels, with less moisture and lower fertilizer cost was still the winner. Belize Ag's Issue 24 (due Feb 2014) will have a more detailed report on the rice industry in Western Belize.

Note: The rice in this trial was grown without irrigation; increasingly more of Cayo's rice farmers are setting up irrigation.

Editor's Note: David Thiessen of Thiessen Liquid Fertilizer and Jerry Friesen, head of the new Spanish Lookout rice producers' co-op kindly provided this data to B. Roberson.



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BEL-CAR UPDATES

Lower Prices but Record 1.3M Cwt. Corn Harvest for Greater Spanish Lookout/Banana Bank Farms

CORN: Cayo's corn harvest for 2013 broke all previous records, with approximately 1.3 M Cwt. (1.3 million 100 lb sacks) harvested from combined acreages of Spanish Lookout's Mennonite farmers and Banana Bank. Shortly after farmers harvested the final acreages from the approximately 30,000 acres, rains pelted the area flooding bridges and closing roads. The corn this year had been a little later than normal by about 1-2 weeks, due to later planting than usual (weather related). Some expressed surprise and relief that the quality had not been more affected, due to unusual weather, for example, rains coming prior to harvesting at the end of September. The yields per acre are slowly climbing up in Spanish Lookout; the exact tallies of acres and lbs/acre were not ready at press time and will be in issue 24 of The Belize Ag Report. Bel-Car estimates the average yield per acre at about 4,000 lbs/acre. Some better hybrids will be over that. Yields used to average 3,500 lbs/ac.

There was not much overlap between last year's corn crop and this new harvest. Last year's inadequate corn storage situation has been remedied; Bel-Car has 200 containers of corn sitting behind the new Koop Sheet Metal buildings on Iguana Creek Rd. They are all loaded, fumigated, inspected and sealed by Belize Agriculture Health Authority (BAHA) and ready for the cranes to move them to the port. Most will be exported to Guyana and Surinam. The price of Belize corn is currently down, reflecting world, and especially Chicago's, corn prices which have dropped about a third since last season. Bel-Car feels that the prices will certainly rebound for next year's corn season, as many US farmers are balking and threaten not to plant corn next year unless their prices are increased.

BEANS: Red Kidney (RK) beans will be planted toward the end of November with Black Eyes more toward December, as it is more critical that the Black Eyes do not get rain during the last weeks. There may be a slight increase in planting RK's and less Black Eyes, because the Black Eyes had a slower selling season. However, Bel-Car believes that a continuation of the current planting ratios would be good, as sales go in waves and what was slower one year may be in more demand the next.

Find local and some international commodity prices on our Agriculture Prices at a Glance section, page 15.

NEW EQUIPMENT: Bel-Car's lab has a new Dickey-John moisture tester, which is 'state-of-the-art', National Test and Evaluation Program (NTEP)-certified and up to US standards.

Article based on interview with Bel-Car's CEO Otto Friesen and reported by Beth Roberson.

International Promotion of Agricultural SME's

By Feucht/Roberson

"Agriculture is the most important economic sector in Belize in terms of income generation, employment, food security and poverty alleviation." **WORLD BANK**



Small and medium enterprises (SME's) are to receive government assistance in the export of their products in accordance with the policy passed in 2013. The workshop on the international promotion of agricultural SME's, held at the George Price Center on October 22 and 23, brought together the stakeholders to report on and discuss the opportunities, successes, and challenges of agricultural exportation. For an inside venue there was an enormous amount of planting those two days: seeds of marketing and business ideas that could germinate and benefit Belizean micro, small and medium ag enterprises.



Ministry of Trade CEO
Mr. Michael Singh

Small enterprises are defined internationally as those having 10 – 49 employees, US\$100,000 – 3\$M in assets and US\$100,000 - \$3M in sales. Medium enterprises have 50 – 250 employees, US\$3M - \$15M in assets and US\$3M - \$15M in sales. Although 95% of all enterprises in Latin America and the Caribbean are SME's, most of the farmers in Belize are classified as micro with less than 10 employees and are not linked to the export market. Those are the enterprises the GOB policy is focusing on. The link, it was emphasized, can be facilitated by co-ops and other collectives/cluster organizations to reduce export costs and address a broad



Mr. Carlos Cerdán Ripoll

Mr. Antonio Leone Durante

market. Mr. Carlos Cerdán Ripoll, Consultant from ONUD-Mexico, described the steps involved and services (initial ones free) available from his organization to farmers to address the international market; he cited many success stories. He explained in detail, what a consortium is: "a voluntary alliance as a machine for export promotion offering specialized services to its members", and how it works. Common misconceptions include that Export Consortium companies merge- and they do not. Also, business contracts are done by the individual companies.

Continued on page 23

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

NOV 2013

A-B denotes the difference between 1st preference & second preference and sometimes between wholesale & retail and bulk or small amounts . Trend (H) means Higher over last 30 to 60 days (L) Lower (S) Steady.

Prices intend on being farm gate in Belize dollars - usually price per lb

T	A	B
BELIZE CATTLE		
Young str. & bulls - 750-1100 lbs	L 1.70 - 1.80	1.60 - 1.70
Cows & heifers for butchers	L 1.45	(thin) 1.40
Heifers for breeding 500-800 lbs	S 1.50	1.35 - 1.45
Young grass cattle - 350-650 lbs	H str. 1.80	Heifers 1.45
U.S. CATTLE		
U.S. price - corn fed - 1000-1200 lbs	H US\$ 1.32	
U.S. price - feeders 600-800 lbs	H US\$ 1.66	
U.S. price - aged butcher cows	L US\$ 0.70 - 0.74	
BELIZE HOGS		
Weaner pigs - 25-30 lbs - by the head	S \$90.00 - \$100.00	
Butcher pigs 160 - 230 lbs	S 1.75 - 1.85	1.65 - 1.75
BELIZE SHEEP		
Butcher Lambs	L 2.00 - 2.25	1.50 - 1.75
Mature Ewes	L 1.75	1.50
BELIZE CHICKEN		
Whole sale dressed	S 2.44	
Broilers - live per lb	S 1.27	
Spent hens	S .95	
VEGETABLES		
Local Potatoes lb	S/L 1.00 - 1.10	.80 - 1.00
Local Onions lb	H/L 1.00 - 1.20	.80
CITRUS		
Oranges per 90 lb box-lb. solid basis	H 11.0139 (1.7525 Pps) final price	
Grapefruit - per 90 lb box	L 9.3461 (2.2853 Pps) final price	

T	A	B
GRAINS, BEANS & RICE		
Belize yellow corn	L .22 - .23	.20 - .22
White corn/cwt	H 30.00 - 35.00 delivered	
Corn/local retail (low volume)	L .30 - .32	.27 - .29
US corn @ US\$ 4.43- per 56 lb bshl	L \$ BZ 15.82/cwt + 8¢ ft. to BZ	
US organic corn - yellow food grade US\$ 11.50/bshl	\$ BZ 41.07/cwt	
US organic corn - yellow feed grade US\$ 10.12/bshl	\$ BZ 36.14/cwt	
US non-GMO yellow corn US\$ 5.34 - 7.62/bshl	\$ BZ 18.56 - 27.22/cwt	
Guatemala corn price/Peten	L .22 - .23	.21 - .22
Belize soy beans/cwt	H .59	.57
US soy beans @ US\$ 13.10 per 60 lb bshl	L \$ BZ 43.66/cwt + 8¢ ft. to BZ	
Belize milo	L .20 - .22	.19 - .21
Red kidney beans	H 1.75 farm price	
Little reds & black beans	S 1.50 - 1.60 farm price	
Black eyed peas	S .65 - .67 farm price	
Milled rice per pound	H .82 - .91 farm prices, distribution .97-1.01	
SUGAR/HONEY		
White sugar - 112 lbs - controlled	S .45 per bag + 3-5 cents markup	
Brown sugar - 112 lbs - controlled	S .39 per bag + 3-5 cents markup	
Honey per lb (Cayo)	2.50 (approximately 12 lbs/gal)	
SPECIAL FARM ITEMS		
Eggs - tray of 30	S 6.75 farm price; retail .30 - .33 per egg	
WD milk per lb to farmer	S contract .50; non contract .45	
Raw milk (farmer direct sales)	8.50 gal (5 gal + 8.00 gal)	

At the Belize Ag Report, we have always considered gate prices to the farmer to be the heart of the paper. Special thanks to the persons assisting with pricing information, and especially to Banana Bank's John Carr who did all of our pricing pages until this issue. Prices look encouraging almost across the board. Cattle have taken a slight dip from the all-time high reported in issue #22; With the scarcity and demand in our neighboring countries, this will climb again. Sheep, pigs and chickens are steady. Corn has followed the dip in N. America, but there is confidence it will be higher for the 2014 crop. Heavy rains arrived in Cayo District just as the final corn harvests were being done - estimated 95% were safely in before the pelting rains of late October. RK and black eye planting time is almost here. Soy, rice and sorghum (milo) are doing well; acreages for all grains are increasing. Citrus continues to face challenges; final orange prices were higher than estimated year's box price, and grapefruit was slightly under. Producers, advertisers, writers and readers: Thank you for your support and interest in our publication. We send you all joyous and productive wishes for the winter. Beth Roberson

Bird Watch - From My Perch

By Marguerite F Bevis



Migratory birds are arriving daily from the North. You can use e-Bird (Bird Log) to enter the birds you see. This information is uploaded to the Cornell University Ornithology Lab. The data becomes available to birders all around the globe. With more and more people using this global database, scientists are learning more about migratory patterns and about the abundance or decline of individual species. There is a "world" version as well as a "Central America" version, BirdLog CA. You don't need both; if you are a world traveler, choose the world version; otherwise, the Central America version is fine.

If you are curious about when the warblers arrive, there is a terrific companion app called BirdsEye CA. There you can browse birds, look up a particular specie and learn quite a bit about it. You can also select the pin icon for a look at all the recent sightings and their locations. There is a link to "notable sightings" on the home page where you will find unusual or rare species. You will be able to see when and where they were seen. Once you have signed in to BirdsEye CA with the same user name you use for Bird Log CA, you will be able to also see your own lists and even find out how you stand among the top 100 Birders of Belize. iBird Pro is a superior application for studying birds, listening to their songs, looking at photos, range maps and getting good descriptions. However, the app covers only birds of North America. It is still a great resource for studying migratory birds. There are lots of features. You can flip through photos and listen to the songs. This app is not tied into the e-Bird network so does not show current locations of birds. In fact their maps do not even show Belize. They are developing an app called iBird Journal. It seems it will function similarly to BirdLog, but again, only migratory birds of Belize are included. You can buy the app at iTunes App Store or go to BirdsEye.com for download links for other operating systems.

There is a mailing list for Belize birders on yahoogroups.com where local birders exchange information, share interesting sightings, or post pictures of mystery birds to get help identifying them. One of the members posted an interesting article from "Science News," September 21, 2013 (www.sciencenews.org) entitled "Collision Course," addressing the issue of making windows safer for birds. You can read it yourself but here are some take home points. Birds can't see glass. Reflections in windows can attract birds. Window screens can help prevent bird collisions. Washable tempura paints provide a simple warning and can be easily changed. Most birds won't fly through a space less than 4 inches wide between vertical stripes or 2 inches high between. Stripes or dots on the outside of the window can break up reflections; vertical lines should be

spaced no more than 4 inches apart, horizontal lines, 2 inches or less. Single decals are not helpful. Bird feeders placed closer to windows resulted in fewer bird collisions than those placed further away. Glass companies are working to develop glass that reflects only UV waves, which birds can see.

An update on hummingbird feeders: I have had good success with the hummingbird feeders simply by keeping them filled with clean water (1 cup sugar to 4 cups water), changing them daily. There are times when I've had to refill my three feeders twice a day. Then I was gone for three days and by the time I returned, the rush was over. There are still several visiting daily, but nowhere near the numbers we were getting in August and September. The lesson is: be faithful. At one point we began having trouble with bees. Bees would swarm to the feeders and drain them in short measure. I noticed the bees were going to one of the two kinds of feeders. They loved Perky-Pet feeders and left the other feeders alone. I tried several remedies. The one that worked best was something I call "Bee Gone." To make it use a small amount of dish-soap with water, add a few drops of orange essential oil mixed together in a spray bottle. Spray directly on the feeders. The birds don't seem to mind. It helped with the stingless bees and the honey bees but not for long. Eventually, I decided to remove the Perky-Pet feeders completely. Suddenly the bees were gone. Eventually I put them up again and had no more problems. They need to stay up because the orioles prefer them. The feeders that the birds love and bees do not prefer are made by a company called First Nature and are available on the web for about US \$11 plus shipping at FirstNature.net and other locations.

Continued on page 17



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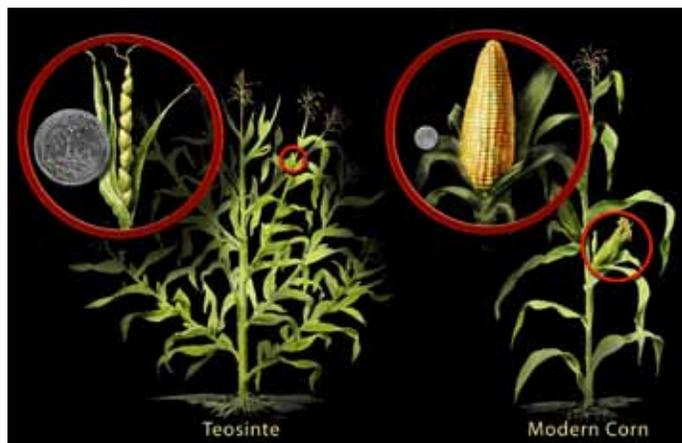
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Mile 8 Mountain Pine Ridge Road, Cayo, Belize

The Development of Corn

By Hugh O'Brien

Belize Grain Growers Association



Scientists have been tinkering with the DNA of plants since the dawn of agriculture. The wild ancestor of corn for example is a grass called teosinte. Teosinte doesn't look much like corn, especially when you compare its kernels to those of corn, but at the genetic or DNA level, the two are surprisingly alike. They have the same number of chromosomes and a remarkably similar arrangement of genes. In fact, teosinte can cross-breed with modern corn varieties to form corn-teosinte hybrids that can go on to reproduce naturally.

At the dawn of agriculture some 10,000 years ago, ancient farmers in what is now Mexico took the first steps in domesticating corn when they simply chose which kernels (seeds) to plant. These farmers noticed that not all plants were the same; some plants grew larger than others, or some tasted better or were easier to grind. The farmers saved seeds from the plants they liked and planted them for the next season's harvest. This process is known as selective breeding or artificial selection. Corn cobs became larger over time, with more rows of seeds, eventually taking on the form of modern corn. By selectively breeding plants, our predecessors transformed a scraggly and inedible grass called teosinte to the large, plump, colorful and nutrient rich corn plant.

Modern maize or corn cannot survive as a wild plant without the aid of humans. In fact its survival for centuries has depended solely on the care given by man. Selective breeding eventually reached its limits, and as a result, yields during the 1920s and 1930s were no higher than those produced in the 1800s. However in 1926, Henry A. Wallace, who later became Secretary of Agriculture and US Vice President, founded the "Hi-Bred Corn Company" as he was convinced that hybrid corn would transform agriculture. The Hi-Bred Corn Company was later renamed Pioneer Hi-Bred Corn Company, and the vast technological advance of hybrid corn made by Pioneer in the 1930s transformed corn production across the world over the next few decades.

Prior to the introduction of hybrid corn in the late 1930s, the highest U.S. average yield was recorded in 1906 at 1,775 lbs per acre. In the 1940s and 1950s, hybrid corn improvement contributed to moderate yield increases as it took seven or more generations (or 7 years) to create new inbred lines. However,

with the development of double haploid technology to quickly produce inbred corn lines, and the use of double cross hybrids, corn breeding improved and yields shot up in the 1960s and early 1970s to a national average of 6,132 lbs per acre in 1979. By 1940 more than 90 percent of the corn grown in North America was raised from hybrid seed, and today average corn yield in the US is 8,697 lbs per acre (USDA, 2013). Hybrid corn is a prime example of technology transfer – from basic research (ie. science motivated by the quest for knowledge) to the transformation of an industry. In the field of agriculture, hybrid corn is one of the greatest marketing success stories of all time.

Using hybrid corn seed technology means that each corn plant is almost exactly the same as the plant next to it (ie. it has almost the same genetic makeup). As a result, farmers are unable to select seeds from their own corn fields for the following crop, and they have to purchase seeds every year from Pioneer and other corn seed companies. This has been the case in the US since hybrid corn dominated corn production in the mid 1900s, and is the same case with mechanized corn in Belize since the introduction of hybrid corn into Belize in the 1970s. Mechanized farmers in Belize have been buying corn seed each year for over 40 years.

Bird Watch...Continued from page 16

During the months the Flamboyant trees are blooming, hummingbirds flock to the feeders. After that the larger numbers stick around as long as you keep the feeders filled with clean fresh sugar-water. It also helps to have lots of other blooming flowers in your yard.

The most common hummingbird is the Rufous-tail, but during migration, you may have Ruby-throated and Black-chinned hummingbirds. If you live in urban areas, put up a hummingbird feeder. Many migrants are already trained to go to feeders in the North so will readily find yours. Eventually, the residents will notice those foreign birds enjoying the strange-looking flowers and they'll check it out. Depending on where you live, you might attract any number of resident species.

Next article will be an update on the Scarlet Macaw, their status, what is being done, and how you can help. Please send a message to marguerite@pobox.com if you have any interesting birding news or comments.

Bird Photos Credit J. Carridi

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The image shows a large green triangle containing a circular logo for the Good Pesticide Management Practices Farmer Recognition Initiative (GPMP-FRI). The logo features a central illustration of a corn cob and a watermelon, surrounded by icons of a person, a plant, and a globe. Below the triangle are logos for the Pesticides Control Board, Baha, Taiwan, and ICDP.

Profitable 'Green' Intensive Commercial Farming is the Future

By Maruja Vargas

Wish to silence environmental critics lambasting the foul of commercial farming and still remain profitable? Looking to contribute to increasing global demand for food while protecting land, water and biodiversity?



Environmental gains alongside intensive

productive and profitable agriculture is not only possible but the future method of farming if we are to double global food production by 2050 while protecting land, water resources, soils and biodiversity for future generations of farmers.

Known as Sustainable Intensive Agriculture, this farm of the 21st century has been implemented and documented for productivity and profitability in Europe and parts of Asia for several decades.

Field margins are the strips of land between the field boundary and the crop, field corners and buffer zones. Research has shown that careful management of uncropped field margins not only contributes to water protection and increased biodiversity, but can also raise the crop profit margin.

It has been demonstrated that field margins help control weed dispersal thus reducing the need for costly toxic herbicides. (Previous studies had raised the concern that field margins, which allow some of the land to remain unplanted, could act as a reservoir for weed germination and increase their dispersal into the crop fields.)

The team from the French National Institute for Agricultural Research (INRA) surveyed the composition of plant species within five-meter wide sown grass strips (SGS) in 10 fields and found the set-aside land resulted in a *sharp decrease* in the number of weeds encroaching into the cropped area.

This is the underlying principle: as a number of the species deemed to be weeds have only small seeds and limited energy reserves, they struggle to compete against grass species that can be planted by the farmers as part of the SGS system.

"Most of the species are not able to germinate on the surface of the soil; as there is no tillage in a well-managed field margin, seeds are more sensitive to predation (from birds, etc.) and abiotic stress (lack of water, etc.)," Dr Chauvel explained.

Field margins properly managed reduce soil erosion, protect waterways and increase biodiversity. Vegetative field margins are easy to implement and require no large investments of equipment or plant material. Vegetative buffer strips increase the populations of bees, butterflies, and other pollinating insects, attract beneficial predators such as spiders and provide birds with insects as a food source.

Field margins planted with grasses, for example, are managed without fertilizer and no tillage, and the grass may be cut for hay each year. Field margins often contain many trees and hedges to create valuable wildlife corridors which link together habitats throughout the farm.

Margins can be managed to provide diverse wildlife corridors

where animals can feed and move in safety across the farm, from invertebrates to deer. When planted correctly, margins can provide corridors of movement for mammals, preventing negative effects on gene pools when small groups of animals are isolated.

Further, by planning with local authorities and the eco-tourism sector, field margins could become a network of hiking trails that help raise the awareness of the public about how care for the countryside and agricultural productivity can work together.

Creating multifunctional field margins within the rural landscape increases resource efficiency and will make a significant contribution towards a more sustainable farming system of the future.

Multifunctional field margins are one of the key European agri-environmental measures. The UK has mandated by law the implementation of multifunctional margins for weed control, ecological reasons such as increase in pollinators, good predators and wild life, especially endangered bird populations.



A comment from US zoologist visiting Belize in summer 2013 stated, "This place will soon become a desert if more trees are not planted, at least along the edges of commercial fields, and possibly cutting the fields into smaller corridors."

If one wishes to view some well developed margins and corridors on a 500-acre farm in the Cayo District, San Lorenzo Farms, owned and operated by the Juan Family, is an excellent example. Banana Bank has incorporated some contoured grass strips in their corn fields that also function for excellent drainage of the black clay soil there.

The proactive management of less productive and marginal areas on commercial farms is one of the most important environmental assets agriculture can provide to take care of our unique natural capital and the ecosystem services it provides. Creating multifunctional field margins within the rural landscape will make a significant contribution towards a more sustainable farming system of the future.

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Competency Based Education Training (CBET) at Central farm.

By Patricia Bidart

Bow Valley College, Calgary, Alberta, CANADA.

Competency based education and training (CBET) is being emphasized in the agricultural sector of Belize. CBET provides learners with the skills needed to perform well in their given industry. Learners need to know what is expected of them, employers need to know what skills their employees have, and instructors need to plan their courses and lessons so as to include these skills. Facilitators from Canada, Pat Bidart (Bow Valley College, Calgary, AB) and Angela Wilm (Lakeland College, Vermilion, AB) spent two weeks working with teachers and instructors at Central Farm, University of Belize. The facilitators provided sessions on active learning strategies to assist instructors in moving at times from a lecture format to an interactive applied format in teaching. The facilitators were very pleased with the passion and energy of the 27 trainers who completed the course.



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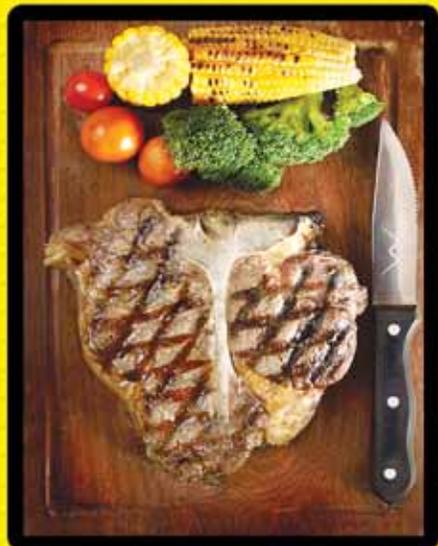
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Homemade Health Coconut Oil

By Marguerite Fly Bevis, R.N., B.S.N.

If I could choose only one thing to keep in my medicine chest, it would be virgin cold-pressed coconut oil. This one substance is a super-food, providing health benefits in addition to supplying important nutrients, including some also found in breast milk. It is also a medicine; it fights bacteria and viruses and fungus. It can be used all over the body, inside and out. It can be used to treat insect bites, rashes, burns and wounds. Used internally, it boosts metabolism and shifts energy levels into high gear. Unlike caffeine, the effects are gradual but not addictive.

What makes coconut oil so special? The difference is in the fat molecules that make up the oil. All fats and oils are composed of fat molecules known as fatty acids. Most of us are familiar with one way of classifying fatty acids, based on saturation: saturated fats, monounsaturated fats and polyunsaturated fats. Another way to classify fatty acids is based on the size of the molecule, the



length of the carbon chain within the fatty acid. There are short-chain fatty acids (SCFAs), medium-chain fatty acids (MCFAs) and long-chain fatty acids (LCFAs). Most of the fats in our diet are composed of long-chain fatty acids (LCFAs). Corn oil, olive oil, canola oil, lard, soybean oil, and chicken fat are composed entirely of LCFAs.

Coconut oil, on the other hand, is composed mainly of MCFAs which give it its unique medicinal and nutritional properties. Triglycerides are the combination of three fatty acids, which are joined together by a glycerol molecule. There are short-chain triglycerides (SCTs), medium-chain triglycerides (MCTs) and long-chain triglycerides (LTCs.)

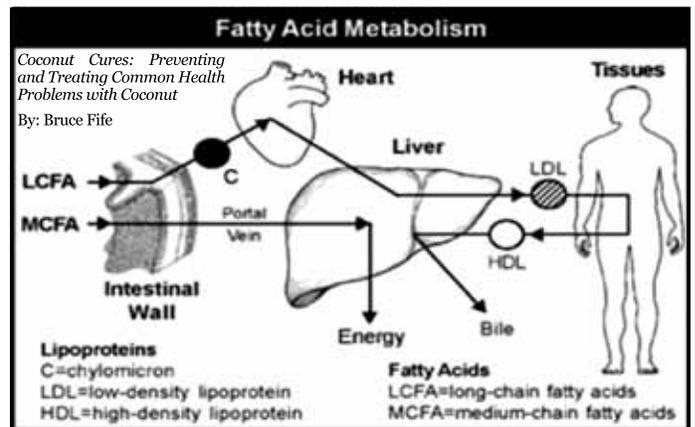
Our bodies metabolize fatty acids differently depending on their size. MCFAs digest more easily than LCFAs and are easily soluble in water. This means that enzymes from the pancreas are not necessary for their digestion.

Foods containing long-chain triglycerides (LCTs) pass through the stomach and are released into the intestinal tract. Enzymes from the pancreas and bile from the gallbladder are needed. As the LCT's are digested, the bonds holding the individual fatty acids together are broken. The individual fatty acids are absorbed into the intestinal wall where they are bundled into little packets of fat and protein called lipoproteins. Lipoproteins then pass into the bloodstream where they circulate throughout the body. While circulating, small particles of fats break off in the bloodstream. These fats end up in fat cells and as arterial plaque. Excess fat and clogged arteries are the source of many health problems.

Medium-chain triglycerides travel through the stomach but are already broken down into individual fatty acids before they leave the stomach. Because they don't require digestive enzymes they are absorbed immediately into the portal vein and sent directly to the liver where they are used as fuel to produce energy. Because MCFAs bypass the lipoprotein stage in the intestine and the liver, they do not circulate in the blood to the extent the others do. As a result, they do not get lodged inside fat cells or clog artery walls. They produce energy not body fat and arterial plaque.

MCTs improve the digestion of other nutrients such as minerals (magnesium & calcium), B vitamins and fat-soluble vitamins (A, D, E, K and beta carotene) and some amino acids (proteins.)

Coconut oil is a better option than sunscreen because it protects against sunburn and against cancer. Unlike sunscreen, coconut oil does not block the UV rays that are necessary for Vitamin D synthesis. Apply liberally and frequently. Eating coconut oil helps strengthen the skin, making it less prone to sunburn. If you do stay out too long and get burned, coconut oil is soothing and helps heal the burn. It



has the added benefit of making skin look and feel healthy, improves blemishes, fungal infections, wounds and sores. Some precancerous lesions and moles may begin to disappear with regular use.

I have been using coconut oil as an insect repellent for several months. It is effective but needs to be reapplied periodically. One word of caution: coconut oil will stain clothes and cloth furniture unless you wash it off immediately with warm soapy water. It is also very helpful for insect bites you receive before you think to put it on. All you need is one product for both bites and prevention.

Ironically, coconut oil is useful for both weight gain and weight loss. It is a natural low-calorie fat. Coconut oil satisfies hunger better than any other fat or food, and it elevates metabolism levels. As metabolism levels rise, calories burn faster. More calories burned means fewer calories converted into body fat. On the other hand, people who are malnourished become healthier and gain weight when coconut oil is added to their diet. The less body fat you have, the less effect coconut oil has on stimulating metabolism. It turns out coconut is ideal for helping you reach and maintain your optimal weight.

Mothers who are breast-feeding can temporarily increase the MCHA content of their milk by 18% by adding three tablespoons of coconut oil to a meal. This enhances the protective properties while providing easily digestible fatty acids necessary for growth and development. Low birth weight infants given coconut oil in their formula grow faster and have a higher survival rate.

Those who use coconut oil daily externally and internally report many benefits. Chronic health problems disappear. Its mild anti-inflammatory effect speeds up the healing process, reducing swelling and pain of all types including arthritis, back pain and fibromyalgia.

There is much to learn about this miracle oil. Recommended is any book by Bruce Fife, particularly "Coconut Cures: Preventing and Treating Common Health Problems with Coconut," which is the primary source for this article. Thank you, Mr. Fife for giving permission to use the illustration from your book.

Thanks for reading! Write to me with comments or questions at marguerite@pobox.com

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PANELA - EVAPORATED CANE JUICE

(That Healthy Molasses Fudge)

By Beth Roberson

India leads the world in panela production and it is known there as gur. In Colombia it's called panela, as in most of Latin America with exceptions of Brazil where it is called rapadura, chancaca in the Andes, papelón in



Venezuela and piloncillo* in Mexico. Colombia is 2nd in world production and first in consumption with a whopping average of 31.2 kg/year per capita. Making panela is Colombia's 2nd leading rural vocation (after coffee cultivation). Panela's precursor, fresh cane juice, is making its mark in trendy North American 'raw cane juice bars', and we expect savvy Belizean establishments to be serving it as well.

Sugar cane is believed to have originated in New Guinea where it has been cultivated since 6000 BC. This member of the grass family produces about 70% of the world's sugar. It likes the humid tropics but tolerates some sub-tropical areas. Sugar cane produces more calories per acre than any other crop

Panela is a value-added sugar cane product. Sugar cane, *Sacharum officinarum*, was and is designated as a medicinal plant. When you see 'officinalis' (or any of its declined forms) used as the species name in the Linneal binomial system of plant taxonomy, that indicates that it's one of over 60 plants designated this way as medicinal.

Sugar cane was originally known for its healing, medicinal and nutritional qualities. Modern cravings for sugary foods have corrupted and maligned sugarcane, destroying its lofty original reputation and relegated it to being renown primarily for its ubiquitous sweetening properties.

Medicinal uses include treatments for digestive disorders, colds and flu. It prevents rickets and many claim it prevents tooth decay. In many places outside the developed world, it has been used for millennia and continues to be used to treat wounds. The explanation for its effectiveness is that bacteria require water to thrive. Sugar draws the water away, denying bacteria their needed water. Panela also contains vitamins A, C, D, E and some B complex vitamins. Panela is sometimes used in facials and masks because the glycolic acid in it purportedly slows aging of the skin.

Panela offers over 5 times the minerals that brown sugar does, and over 50 times that of refined white sugar. Minerals include: potassium, calcium, phosphorus, magnesium, iron, copper, zinc, and manganese. Panela's rich mineral contents remind one of alfalfa as alfalfa's roots encounter their mineral sources at depths to 26 feet. In a study done by Evans in 1936, he reported that sugar cane's roots "can grow to a depth of 6 m (18 ft) in favorable conditions". Sadly, Chopart found in 2009 that "no recent publications observe sugar cane roots below a depth of 2m (6 ft) since the 1930's". What are the root depths of Belizean sugar canes? Do the root depths differ between commercial and home plots?

The glycemic index (measurement of how quickly a food will raise blood sugar levels) is another factor making panela one of the healthier sweetener choices. Panela is a combination of

sucrose, glucose and fructose; the refining process for white sugar removes almost all the fructose and glucose, leaving almost solely sucrose. That is why white sugar's glycemic index is so much higher. See table below:

GLYCEMIC INDEX for Some Sweeteners			
Agave Syrup	15	Panela	55
Raw Honey	30	High Fructose Corn Syrup	62
Coconut Palm Sugar	35	Brown Sugar	64
Fresh Cane Juice	43	Pastuerized Honey	75
Maple Syrup	54	White Sugar	80

To make panela, first the raw cane must be crushed in some kind of mill or trapiche. The bagasse (spent husks) left after extracting the juice can be used later to fuel the fire. The juice is simmered in copper caldrons slowly evaporating approximately 90% of the water to make a thick syrup. The cachaza (impurities which float to the surface) is manually removed from the top. When ready, if a wooden mold is to be used, the mold is saturated with water immediately before pouring the molten sugar syrup into it. This saturation prevents the panela from sticking to the wood.



The large and irregularly shaped panela crystals melt in your mouth, as maple sugar candy does, which is why we call it 'molasses fudge'. Try it; the taste is not nearly as overwhelming as molasses and it's a very complex blend of flavors. Use it in place of brown sugar in most recipes, such as in beans, pumpkin and sweet potatoes. Many say that they use lesser amounts of panela when making substitutions, as the flavors seem to be more vivid with the panela. The pieces we found locally, are solid but soft enough to scrape off pieces with a knife or to be grated with a large-hole grater. To liquefy, simply heat it up in a liquid; it melts easily. For classic Colombian 'café de olla': boil dark-roasted coarse coffee grounds in large pan with water, cinnamon stick, and panela to taste. Sweeten other beverages.

Sources suggest panela should be consumed within 15 days of opening; we are finding the shelf life longer. Claims are that well sealed packages of panela, kept in a dark cool place will last up to 3 yrs. In San Ignacio's market, an approximately 1.5 lb round molded piece sells for \$3.50 (Bz\$). Several villages in Cayo produce panela, including Bullet Tree Falls.

*In Mexico there is a specialty cheese called queso panela – don't confuse this with panela!

Editor's Note: Having looked at panela in the markets of Central America for over 40 years without appreciating its virtues, we thank Peter Singfield of Xaibe for bringing this gem to our attention.

Look for information on various sweetener substitutions in *Ask Rubber Boots*, issue 24.

The Toledo Cacao Growers Assoc. (TCGA) plans their Annual General Meeting for January 18th, 2014, in Punta Gorda Town, Toledo District.



Mamey Sapote

By Mary Susan Loan of Cristo Rey Village

This is the last apple in the 'Apples of Belize' series. Although none of the apples in the series (custard apple, star apple, mamey apple, sugar apple, wax apple or bell fruit, velvet apple) are botanically classified as apples, they are all widely recognized as, and called apples. (As they do not look like apples, or grow on trees, pineapples are not part of the 'apple' series).



The Mamey sapote (*Pouteriasapota*), is a member of the Sapotaceae family. Mamey is also spelled Mammee, Mammey, Mammy or called Mamey Apple and is also known as Zapote Colorado in Spanish. The Mamey sapote is a fruit-bearing tree which is native to Mexico and Central America. The long fascinating history of Mamey sapote dates back at least to the early Aztec and Mayan days. Fruits were recorded as growing in Panama in 1514. It has been documented that Mamey sapote fruits helped to keep Hernan Cortez and his army alive on their famous seven hundred mile expedition from Mexico City to Honduras in 1519 that caused the fall of the Aztec empire. Mamey sapote is the national fruit tree of Cuba and has grown in popularity in Central America, Puerto Rico, the Dominican Republic, southern Florida and Australia. Mamey sapote trees and fruits are related to other sapotes, such as the Abui, Sapodilla and Canistel, but is not related to Black or White sapotes or the Mamey apple (*mammee Americana*), which is a different fruit widely known by the same name. The thirteen or more varieties of Mamey sapote fruits are actually botanically considered as a berry and are likely the largest berries in the world!

Mamey sapote trees are propagated primarily from grafting as they are slow growing and may take up to three years or longer to bear fruit. Seeds may be planted by removing the dark shiny coating and planting the seeds with the more pointed end planted towards the bottom of the hole, with the top protruding approximately one-half inch above the soil. Seeds lose their viability once removed from the fruit and are best planted within two weeks after the ripe fruits are harvested. Trees grown from seeds may bear in approximately seven years. The highly ornamental deciduous evergreen tree at maturity can grow to be between sixty and one hundred and forty feet in height. Shiny, dark green leaves grow from thick strong branches, are tightly clustered and measure anywhere from five to twelve inches, or longer in length. The trunk of the tree is short and stout with longitudinally fissured bark. Small yellow flowers approximately one-half inch in diameter grow in clusters directly from the tree limbs and grow to fruit in approximately one year to be ready for harvest in and around Central America from May through September. Each tree produces between one hundred and fifty to over five hundred or more fruits per tree at maturity. The trees are long-lived and can survive and bear for generations. Mamey sapote trees are disease resistant and grow best in heavy, but well-drained soil.

Mamey sapote fruits are oval or elliptical in shape, somewhat like a small football, with tough brown leathery skin with a corklike grit. Fruits weigh from one to eight pounds and measure from four to about ten inches. Each fruit contains a glossy dark brown oval shaped seed with pointed ends, though some varieties may have up to four seeds. The sweet, semi-firm, not juicy, melting, smooth fine-grained, creamy fruit of the Mamey sapote ranges from pink to crimson and when ripe, is generally a brilliant, dark rich orange color. When the fruits are ripe they fall to the ground. Fruits are ripe when they feel just slightly soft to the touch and reveal orange-colored flesh when scratched. When ripe, fruits keep well in refrigerator for three to four days and the pulp freezes well. The flesh of the fruit has an exotic, distinctive, but difficult to describe taste and a mild pleasant aroma. The taste is unique. Some describe the flavor to be similar to "a cooked sweet potato, sort of peach-like with undertones of raspberry, cherry, persimmon, apricot, banana, coconut, dates, chocolate, caramel, honey and vanilla, spiced pumpkin pie filling, with a hint of cinnamon or almond." The almond aroma is due to the presence of cyanide in the pit of the fruit. The oily bitter cyanide in the pits may be removed by boiling or roasting the pits. Mamey sapote pits, called puxtli, when boiled with herbs or smoked over a wood fire, are used to flavor mole or in enchiladas de puxtli. Ground pits are also used as an ingredient said to help heal head rashes and help encourage hair growth. The amazing seed kernels also contain insecticidal compounds when grated and added to water. Beauty products are made from the oil pressed from the seeds, known as sapayul or sapuyulo oil. Mamey sapote trees and fruits also contain a copious amount of milky latex-like sap which is used as an emetic, anthelmintic, and to remove warts and fungal growth. In Brazil a fermented wine known as 'toddy' is made from the sap of the tree. The leaves are considered to be poisonous.

Fruits are mostly enjoyed raw; in salads; eaten with a spoon from the skin; or made into fruit smoothies, ice cream, fruit bars, milk shake drinks, jams and jellies or can be baked in cakes and pies. The Aztecs created a recipe for



making a delicious foamy, spicy chocolate drink, tejate. A sweeter version of tejate is still enjoyed in parts of Mexico and Central America; seed kernels are ground, boiled, then roasted and mixed with cacao and sweetener. The Mamey sapote fruit is a favorite of Howler monkeys. Mamey fruits are rich in vitamins A and C and are considered a significant source of iron, riboflavin, magnesium, copper, potassium and fiber. One cup of Mamey sapote fruit contains approximately 135 calories.

Wood from the Mamey sapote is hard, fine grained and easy to work with. It is seldom used for timber or to make wooden products as the tree is highly valued for its fruit.

Belize is a Mamey-friendly country. In season, from May through early September, Mamey sapotes fruits can be found in the open-air markets around the country. Trees are grown in backyards, farms and in villages across Belize.

International Promo... Continued from pg 23

The two main types of consortia which he discussed were Promotional Consortia and Sales Consortia. Look for more information on this topic in the next issue of our publication.

Mr. Jose Alpuche, CEO of Ministry of Agriculture and Natural Resources, opened his address with the comment that although there have been many programs for small farmers, most of them have not focused on business support which could enable SME ag/food producers to enter the 'robust regional agriculture markets'. Belize has an established export capability (sugar, corn, rice, beans, citrus, poultry, bananas, fisheries and beef); now for SME's to 'internationalize', Mr. Alpuche emphasized that the "foundation challenges to satisfy the mantra of high quality, consistency of supply and competitive pricing" remain critical.

Mr. Frank Lam, Agribusiness and Trade Specialist for Instituto Interamericano de Cooperación Para la Agricultura (IICA) in Florida said that countries do not compete – products do. "Even in Haiti," he said, "where mangos are superb, they are exported successfully to the U.S. and Canada." There is a growing demand for quality and consistency of product. Consumers are becoming savvy about the food they eat. Farmers who are aware of market demands and address them will become the success stories of the future. An example is a client of Beltraide, a farmer who grew tomatoes and peanuts but couldn't sell them because the market was flooded; he turned his situation around by producing ketchup and peanut butter. One of his biggest challenges was packaging. It was noted that one of the most glaring enterprise niche opportunities in Belize is packaging.



Mr. Frank Lam

The encouraging philosophy of working with not just the people **ready** to export, but rather with the next group down, people that **could** get ready to export, and attending down the line to keep the progression of growth moving upward, was the message of Beltraide's new commitment to agriculture. It's an uphill job, but with Belize's farmers, land, natural resources and with hungry and viable markets close by, increased agricultural growth and success for Belize is more than possible – it's probable.

Other speakers at the forum were: Mr. Antonio Leone Durante of SELA (Sistema Económico Latinoamericano & Del Caribe); Mr. Michael Singh, CEO Ministry of Trade & Investment Promotion; Ms. Diana Hernandez, Export Development Office, Beltraide; Mr. Hero Balani, Beltraide's Export Promotion Officer; Mr. Omar Castillo, Business Advisor at Beltraide; Ms. Orla Kantun Coleman of the Ministry of Foreign Affairs; Mr. Gareth Murillo, Registrar of Cooperatives; Mr. Jose Angel Cabrera, Expert from Guatemala; Ms. Helen Chang, Expert from El Salvador; Mr. Francisco Guterrez, Director of Plant Health, BAHA; Mr. Andy Sutherland, Trade Economist in the Directorate of Foreign Trade; Ms. Emily Stone of Maya Mountain Cacao, Ltd; and Mr. John Carr representing the livestock industry.

Editors' Note: We encourage all small and micro agriculture enterprises who aspire to enter the export market in the near future to contact Mr. Hero Balani at hero@belizeinvest.org.bz or find him at Beltraide's Belmopan office, tel. 822-3737. Also we wish to thank IICA's Ms. Yvette Garcia for her attentions to the Belize Ag Report.



Guidelines for Farming Watch the Moon Phase



By Mary Susan Loan of Cristo Rey

Belize farmers are captivated by gardening by the phases of the moon. Since prehistoric times farmers have discovered that various plants do best when planted and harvested at certain phases of the moon. Before planting or harvesting follow the rules of thumb:

1. Crops that produce their yield above ground should be planted during the waxing moon (new to full). The first week is especially good for crops that have their seeds on the outside, and the second week (between the first quarter and the full moon) is the best time to plant crops that produce seeds on the inside.
2. During the waning moon (full to new moon) is the time to plant root crops. No planting is to be done on the day of the new or full moon.
3. Fruits harvested during the full moon phase tend to weigh more and get a higher price in the market.
4. Cutting wood: wood to be used for building (or fence posts) should be cut only during the phase of the full moon (three days before until three days after), as the sap rises and helps to prevent room for wood lice, ants and termites.
5. Firewood is said to burn better when cut at the time of the new moon.
6. Prune trees during the first quarter moon.

This info has been gathered by interviewing several Belizean farmers and woodworkers. For more information on the effect of the phase of the moon on agriculture see Issue 13, pg. 23 of the Belize Ag Report.

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AG BRIEFS



BEL-CAR has again given Belize some very positive international exposure, with an



World record watermelon:

Chris Kent of North Carolina has broken the world record for largest watermelon for the 2nd time. In 2010 he broke the records with a 291 lb pounder, ousting previous record of 268 lbs.



interview of their articulate CEO Otto Friesen, on bean exportation. Find it on International Food Trader's website, accessible via link below.

<https://www.goift.com/news/131018-pulse-interview-belize-top-bean-exporter-an-interview-with-otto-friesen-bard/>

New corn variety: PuraMaize corn hybrids block GMO contamination

and color impurities. Although pollen from other (unselected/undesirable) corn may germinate on PuraMaize, only its own pollen will achieve fertilization. For more information on PuraMaize: www.blueriverorgseed.com.



ORANGES: Costa Rica's 2012 orange harvest grew by 75% compared to 2011's. Some small coffee farmers in areas such as Guanacaste, have added citrus in efforts to diversify in the face of declining coffee prices.



CITRUS to OLIVES in Florida:

Facing increasingly difficult problems such as HLB (citrus greening), Florida citrus growers are turning to other crops: blueberries, pomegranates and now olives.



Of the 85M gallons of olive oil consumed in the USA in 2012, 98% was imported. Currently there are around a dozen commercial olive growers in Florida, with approximately 200 acres planted.



Watermelon: Honduras is the world's leading exporter of watermelons. In 2012 they shipped over 79M US\$ worth to the USA, Canada, Mexico, Costa Rica, El Salvador, Nicaragua, Guatemala, the EU, and Asia. Their goal is to exceed this amount in 2013.

This October, he brought a **350.5 pound watermelon** to the 2013 Pumpkin and Fall Festival in Hamilton, Ohio, winning again. Kent says although the jumbo fruits are edible, they tend to be less sweet and more coarse. Growers such as Kent usually sell the seeds (estimated 1500 seeds in the 350.5-pound fruit) in packs of 3 to 4 seeds online, for prices around \$40 USD/pack, in order to recoup expenses and also often raise funds for gardening clubs.



BANANAS: Walmart, the world's largest food retailer, disclosed that bananas have been their 'best selling item' for several years.

Belize's PCB (Pesticides Control Board) confirms to the Belize Ag Report, that El Salvador has indeed banned glyphosate (the active ingredient in the world's most popular herbicide, Roundup®) and 52 other chemicals, including Paraquat and Endosulfan. In Issue #15 (March 2012) of the Belize Ag Report, (pg 26) we reported that El Salvador's Minister of Health pleaded for help from the international community to find the cause of the "mysterious epidemic of chronic kidney disease (CKD) which as Salvador's 2nd largest cause of death is wasting away our populations". The effective dates for implementation of the bans vary, with most taking effect after a year, to allow growers time to identify alternatives.



Continued on page 25

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

Ag Briefs...Continued from page 25

Just days before a recent March Against Monsanto protest that took place globally on October 12, Mexico, the geographical birthplace of modern-day corn, instituted a regulatory ban on all plantings of genetically modified (GM) varieties of this staple food crop. A victory for food freedom and agricultural integrity, **the announcement was made at a press conference in Mexico City on October 10, where officials notified the public and the press that all GM corn plantings, including pilot commercial plantings, were to be immediately suspended. Mexico will still import GMO corn, despite ban.**



http://www.naturalnews.com/042660_Mexico_GMO_corn_genetically_engineered_food.html



The Results from **UCLA's Pesticides Drift Study – Maya Mountain Protected Areas of Belize** can be sourced at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3017314/?report=classic> . **Over 3 years, testing at 7 sites within the reserves, showed every sample positive for glyphosate (Roundup®) and organophosphates found to be more common at ridge sites.** The study's author, Ms Kristine Kaiser, stated that "Many farms surrounding the protected areas relied heavily on agrochemical application." She reports high pesticide use in all regions of the country. The report states that spraying from backpacks or airplanes can lead to aerosol overspraying, 'causing toxicological effects on non-target species and also causes pesticide drift into fresh water ecosystems'. She advises further studies on these issues.

USA: The US national cattle herd has diminished to the lowest levels in 61 years, feeling the effects from 2012's drought conditions and resulting high feed prices. Consequently, US fed steer prices and feeder stock prices have risen.



BLPA's (Belize Livestock Producers Ass'n) new CEO Alistair McPherson reports that 89% of all the cattle in the country have been tested during the national cattle sweep. The teams are now moving into the Southern districts of Stann Creek and Toledo to complete the estimated 7000 head there. Mr. McPherson will have a full report on this and Belize's cattle industry in our issue 24 (Feb 2014).

Belize Livestock Producers' Association

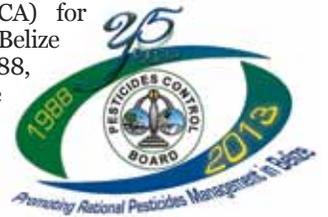


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The Pesticides Control Board of Belize celebrates its 25th anniversary

The Pesticides Control Act (PCA) for the regulation of pesticides in Belize came into effect in December 1988, bringing into existence the Pesticides Control Board (PCB), a statutory body mandated with the implementation of the provisions of the PCA. The PCB Secretariat is excited to announce its plans to mark this important 25 year milestone at an event scheduled to be held in November 2013.



The event will have the participation of the Food and Agriculture Organization of the United Nations, the Ministry of Natural Resources and Agriculture, and other stakeholders. There will be a panel presentation and discussion titled "Sustainable Agriculture and Pesticides: Regulation and Responsibility" and an expo featuring technological innovations in pest management and outreach programs that support sustainable agriculture.

The Pesticides Control Board of Belize looks forward to stakeholder participation at this event which will present the salient issues in the regulation of pesticide use and management within the perspective offered by 25 years of hindsight and the broader topic of sustainable agriculture. The 25th anniversary celebration of the Pesticides Control Board will be carried out under the theme: **"Sustainable agriculture: sustaining livelihoods through the rational management of pests and pesticides"**.

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TO THE EDITOR

Continued from Page 4

While some of the above genetic improvements in corn are in the experimental stage, the use of Bt corn has been very successful commercially. The gene for Bt corn was obtained from *Bacillus thuringiensis* (Bt), which is a common soil bacterium that is also found on the leaves of plants, in stored grain, as well as human food, including milk, green-tea and leafy vegetables. These bacteria produce a group of insecticidal crystal proteins (known as Cry proteins or Bt proteins) that kill a specific group of caterpillars or larvae mostly of butterflies, moths and beetles. The Bt proteins are considered harmless to humans and animals as well as most insects that are not plant pests. In addition, the Bt toxin is only activated in highly alkaline conditions (ie. at pH 10) in the gut of insects, and hence is not activated in the acidic conditions of the human stomach. Bt proteins are destroyed when heated to 70 degrees centigrade (ie. 30 degrees less than the boiling point of water), are unstable and are destroyed by digestive enzymes in the human stomach. These proteins are highly specific to the caterpillars they kill and they do so by binding to specific receptors in the stomach of the insects. This creates holes in the stomach walls, causing the stomach to leak and eventually this kills the caterpillar.

Bacillus thuringiensis or the Bt proteins it produces have a long history of safe use. It was first discovered in 1901, and has been in use to control insects since the 1920s. Organic farmers have been using the Bt bacteria* and the Bt protein in about 40 different formulations as organic pesticides (eg. Dipel in Belize) for over 50 years now on vegetables such as cabbages and tomatoes that are eaten fresh. Because Bt is considered safe, it is allowed to be used up to one day before harvesting by organic farmers.

With agriculture being the foundation of Belize's economy, and corn farmers willing to begin using Bt corn, why aren't they allowed to grow it?

As the Board of Editors of the Journal Scientific American wrote on the Science Agenda of GMOs and Food in its September 2013 issue: "Ultimately we are deciding whether we will continue to develop an immensely beneficial technology or shun it based on unfounded fears."

Hugh O'Brien

*** Editor's Note: Organic farmers use Bt as an external spray only. Bt corn has the Bt gene inserted inside the corn's cells. Some Bt corn varieties are registered as insecticides.**

Dear Editor,

Response to Hugh O'Brien's Article in Issue 22

I am wondering how much more support the Belize Ag Report is going to give the promoters of GMO crops. The latest example is the article by Hugh O'Brien. It continues to give out the same free pro-GMO tickets for a ride to crop-yield paradise while the substantive, evidence-driven objections to the pro-GMO proclamations that have been raised in the BAR remain uncontested by these promoters. If they cannot offer any substantial, specific contrary scientific evidence - and mere proclamations from DuPont or Monsanto marketing material are not - then there is nothing of substance to print from them.

Increasingly, GMO as it relates to corn, is being shown to be a premature and presently faulty technology. Maybe decades in the future it will be sufficiently understood to be used beneficially. Its premature introduction into the biosphere is evidenced, in the instance O'Brien cites, by the removal long ago by Campbell Soup Co. of GM tomatoes from their foods. The precedent set by the tomato failure has been repeated in NK603 GM corn and Bt cotton in India, where thousands of farmers committed suicide (many of

them by ingesting the very toxins they would have used on their crops) because of bankruptcy due to inadequate crop yields of Bt cotton. The official report from their investigation substantiating this claim was published by the Indian government. The recent research by Seralini in France was thorough and carefully conducted, as can be seen by anyone competent to read scientific research papers; the paper is available on the Web and links have been given in prior BAR issues. Monsanto press releases against Seralini's research are superficial and even illogical in places, and Seralini himself has adequately rebutted them. Governments in Europe, Latin America, and Asia, on the other hand, have accepted it on its scientific merits. Consequently, we are seeing a new wave of global opposition to GMO food.

The Indian government report and Seralini's study are not mere proclamations but investigations - one social and the other biological - into GM issues, and are but two instances of factual support which back up rejection of GMOs. The recent global backlash against Monsanto has been driven, in part, by recent discoveries showing glyphosate (Roundup) to be more hazardous to health than previously supposed. Monsanto stock has been suffering accordingly; even their top executives sold large amounts of their own Monsanto stock. Monsanto desperately attempts to use its political clout to have laws passed in order to effect its ends rather than appeal to truth and to the markets.

The pro-GMO people have offered no substantial rebuttals to these and other claims against GMO use. Why is this? O'Brien's role in promoting GMOs is tainted by being paid to proclaim its benefits. He ends his article with a much-repeated but nebulous claim: "With scientific evidence behind GMOs ..." Evidence for what? www.responsibletechnology.org explains much of the fraud behind pro-GMO so-called scientific evidence. How about substantiated evidence instead of proclamation? Perhaps this is why Belize is not "embracing this technology".

Dennis Feucht



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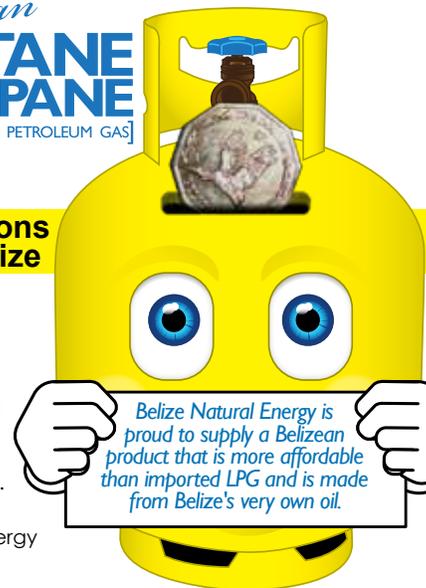
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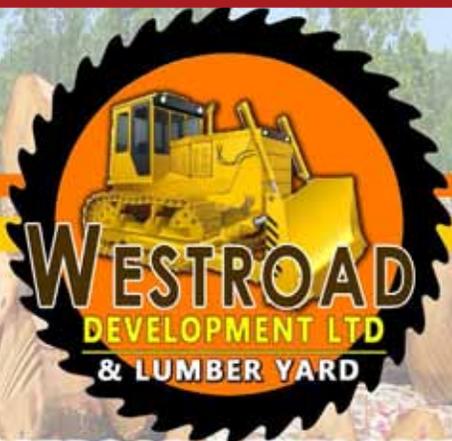
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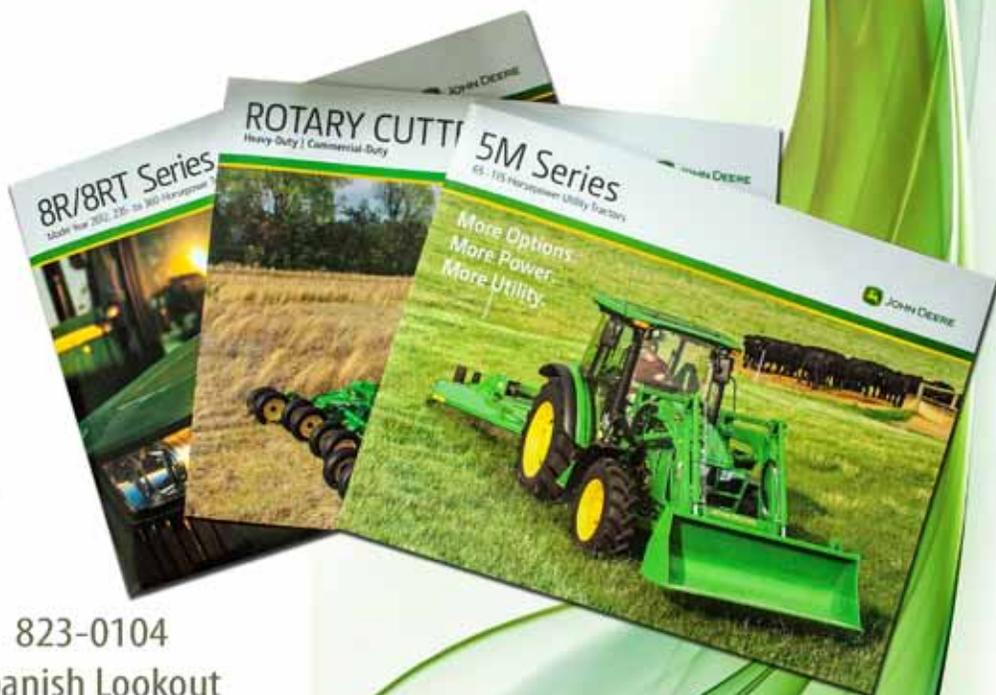
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