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Spices

By Dr. Thomas Mathew of the Belize Spice Farm

Spices are plant products used to flavor or preserve food. Some spices are also used in medicines, perfumes and cosmetics. The spice trade began thousands of years ago by Arab merchants who controlled it. Later, Europeans dominated the trade, taking advantage of the monsoon wind (wind patterns between continents due to seasonal temperature differences). In 1499, the Portuguese explorer Vasco de Gama landed on the Malabar Coast of Kerala, India (where the author was born and raised), in search of spices. At about the same time, Columbus, while trying to find a western route to reach India (also searching for spices), found the "New World". The spice trade strongly influenced world history. Colonial powers controlled many spice growing regions of the world and competed to gain and retain the control. Spices were the most precious commodity in the world at one time.

India and Indonesia were the sources for black pepper, cardamom, cinnamon, cloves and turmeric. Allspice, bell and chili pepper, vanilla and chocolate were the New World's contributions to the spice family.

Botanically, spices are variously classified as: dried fruits or seeds, such as black pepper; arils, such as mace or nutmeg; barks, such as cinnamon and cassia; dried flower buds, such as cloves; stigma, such as saffron; roots or rhizomes, such as turmeric and ginger; or resins, such as asafetida. The flavors of spice come from their volatile oils, which are oxidized on exposure to air and accelerated after powdering.

The Belize Spice Farm, located in Golden Springs, Toledo, imported the mother plants of all their spices from Kerala, (Malabar Coast), India about 20 years ago. The plants have acclimatized to Belize but seem to retain their high "Malabar" qualities.

Black Pepper (Piper nigrum)



Black pepper originated in India but is currently grown in many tropical countries. Black pepper is the most traded spice commodity in the world. Plants can be grown from seeds and the germination takes over 30 days. More commonly, the propagation technique is by planting cuttings. Black pepper plants require filtered sunlight especially when they are young and they need either a trellis or a host tree for support. The vine produces sticky roots which adhere to the host tree or trellis. Almost any tree or even wooden posts can be used for support. The Belize Spice Farm uses Erythrina, coconut and teak trees.Plants grown from cuttings produce in 2 to 3 years. Black pepper plants prefer organic fertilizer and thrive in hot humid conditions. Well-drained soil is ideal for black pepper cultivation. The flowering season is after the first few rains at the end of hot season. The flowers are white and pendulous.Pollination is by water droplets.

Harvesting starts around December. For regular black pepper, the

seeds are allowed to get fully ripe. Harvesting is done by handpicking. The seeds become hard to touch when they are ripe and some may turn yellow. The seeds are dipped in hot water and dried in the sun where they acquire the typical black color with wrinkled skin.

For making white pepper the ripening process is allowed to continue until the seeds are red. They are soaked in water for several days and the outer covering is removed and the seeds are dried. Green pepper is made from immature seeds. The green and white peppers have less pungency. Ground white pepper has a slightly different taste from regular black pepper and is used in cream sauces, mashed potatoes, soups etc. Pepper corn also can be preserved in brine or vinegar and the color is retained.

Cardamom



Cardamom belongs to the family Zingiberaceae. There are two varieties, black and green. Cardamom grows well in the hills of Kerala, India and is native there. A German coffee planter introduced cardamom to Guatemala in 1914.Years later Guatemala replaced Kerala as the top producer of this spice.

Plants can be grown from seeds or from cuttings with the rhizome attached. Seeds are slow to germinate. Plants grown from cuttings will produce in 2 to 3 years. Plants require shade or indirect light. Flowers originate close to the roots on a pedicle. Fruits have pale green color when they are young and gradually turn dark green as they mature. Like many other spices cardamom also is hand-picked and dried. In Kerala, this involves special processing to retain the green color.

Cardamom seeds have a minty flavor and contain 8 % volatile oil which is responsible for the rich fragrance. Cardamom is used in many Indian, Arabic and European dishes. It is a vital ingredient of Chai. In Belize, farmers have started planting cardamom. The author has visited such a farm in Crique Sarco, Toledo District. The farm is beautiful, well maintained and productive.

Continued on page 5



Guest Editorial, By BIRD WATCH - FROM MY PERCH columnist,

Marguerite Fly Bevis

The Chiquibul Forest Reserve - Ours to Keep

In the last column, warnings were issued to all Belizeans about the dire situation the Chiquibul in Forest Reserve, the incursion and theft of natural resources and the woeful



lack of personnel and equipment to deal with the problem. In September 2014, a tourism policeman was murdered at Caracol in the middle of the day, witnessed by horrified tourists, tour guides, and a fellow officer. The police had confiscated horses the previous day from illegal loggers who returned to issue their revenge on the unsuspecting young Danny Conorquie, who gave his life in the battle for sovereignty of this great nation, Belize.

The resulting outcry was immediate and agonizing. Finally, Belizeans woke up to the unpleasant fact that Belize has been invaded and, indeed, is at war for its very sovereignty.

Because of a continued lack of security efforts along the border by the Government of Belize for many years, the Guatemalans were emboldened to cross into Belize. It was just a matter of time before they would retaliate for Belizean authorities doing their job and disrupting their illegal activities. Unfortunately the victim was a 20-year-old Belizean who became the lightning rod of their anger and didn't have a chance, being ambushed from behind in a tranquil plaza at Caracol, shot in the back and then executed by

Mission Statement:

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

The Belize Ag Report, P.O. Box 150, San Ignacio, Cayo District, Belize, Central America Telephone: 663-6777 *(please, no text, no voicemail)* Editor & Publisher: Beth Gould Roberson Special Editor: Dottie Feucht Printed by BRC Printing, Benque Viejo, Cayo District, Belize **Submissions as follows:** Letters to the Editor, Ads & Articles to: belizeagreport@gmail.com Deadlines for submissions: 1st of the month prior to publication. 4 Issues per year shots to his head. Because of the sequence of events, it is presumed that these were illegal Guatemalan loggers who tend to be some of the most dangerous of the "invaders" crossing into Belize. As we have seen in Belize, Peru, Brazil, Indonesia and in other midlatitude countries, the illegal lumber cut and sold is prime old growth cedar, mahogany and rare sought-after hardwoods, which many times end up being shipped to North America to satisfy those high-priced markets.

It is important to note that the Caracol National Monument and Park is surrounded by, but not under the jurisdiction of, the Chiquibul National Park and therefore is not patrolled by Friends for Conservation Development (FCD). The National Institute of Culture and History (NICH) is the trustee of this area and is in charge of patrolling using the Belize Defense Force (BDF). The tourism police tasked to Caracol are trained by the national police as special constables to protect and keep order at these remote ruins, which, until September, was a relatively safe assignment with only minor incidents of theft by Xateros from Guatemala.

Ministers and other officials recently visited the Chiquibul and discovered the stories were, indeed, true; they realized the gravity and importance of the situation and resolved to implement change. The first issue to be addressed was the size of the patrol force. FCD has had men patrolling the area, but there is too much ground to cover by too few men, now known as the "Magnificent Seven". Other measures identified are the need for better communications and transportation. Money is needed to better equip and pay for the rangers who live away from their families for days, sometimes weeks at a time while on patrol. Rafael Manzanero, FCD, and others organized a Saturday telethon on October 18th, and an astounding BZ\$320,000 were raised that day. Political concerns were filed away for another day and people came together as a nation to support this important cause. The support and money are a huge boost and will help in the goal of FCD to fund up to 24 rangers who will rotate in and out of the reserve. In addition, more BDF soldiers will patrol the area with FCD rangers. It is anticipated that the additional forces will minimize the incursion onto our beloved soil. Still there is a need for permanent sustainable protection. If the Chiquibul National Park were to be designated a World Heritage Site, world-wide attention would result in additional funding opportunities for the future. Experts from around the world are already discussing and planning ways to make this area accessible to the few intrepid ecoadventurers willing to forgo luxury in exchange for adventure and a rugged, but satisfying experience.

Protected, the rainforest will come back, the birds and animals will return and the Scarlet Macaws will flourish and multiply.

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Spices ...Continued from page 3

Clove (Syzygium aromaticum)

Cloves are dried immature flowers buds of the clove tree. Clove is grown in many tropical countries such as India (Kerala), Indonesia, and Madagascar. Trees may grow to 20 to 25 ft. and do well in mountainous terrain. Plants are grown from seeds and are slow growing. At the Belize Spice Farm we have 2 clove trees about 20 years old. One of them produced a few flowers just last year. Plants do not grow well in bright sunlight, especially in the hot season.

The flower buds are picked and dried. The flavor of cloves is due to the active ingredient, eugenol, which is toxic in large quantities. Cloves are used in Indian, African, Mexican and Middle Eastern cooking and are also used to spice up alcoholic beverages. Clove oil is used in dental emergencies as a pain killer and also has found a place in the fragrance and aroma therapy industries.

Nutmeg (Myristica fragrance)

Nutmeg is actually 2 spices in one; the nutmeg is the actual nut itself and the bright reddish-laced covering around the nut is called mace. Nutmeg is grown in many tropical countries including Belize. During Colonial times nutmeg was introduced to Grenada. Grenada leads the world in nutmeg production.

Nutmeg is slow growing, taking over 10 years to start production and about 20 years to be fully productive. However, the time to reach production is much less for grafted trees. Trees require protection from the hot sun when they are young and need irrigation. Nutmeg is a dioecious plant; so both male and female plants are needed for production. The ratio is 1:20. The Belize Spice Farm produces male and female grafted plants.

A nutmeg grater is used to make fresh nutmeg powder. It is widely used in soups, sauces, and baked goods. Mace is used in medicine, Indian cooking and perfumes. The outer fleshy fruit part of nutmeg is used to make jam, fragrant candy and nutmeg wine.

Nutmeg owes its fragrance to the active ingredient myristicin, (a moamine oxidase inhibitor), and possesses psycho-active properties. If consumed in large quantities, it can cause convulsions.

Cinnamon (Cinnamomum verum)

Cinnamon is the spice obtained from the bark of the cinnamon plant. The plant is native to the Malabar Coast of India, and also Sri Lanka. This spice was imported to Egypt as early as 2000 B.C. Colonial powers controlled the cinnamon



trade and established cinnamon plantations in Ceylon (Sri Lanka) and in Kerala, India. Sri Lanka is the world's largest cinnamon producer. As cinnamon grows very well in Belize, we have the potential to become an exporter.

Cinnamon plants are started from seeds. They are allowed to grow for 2 years, then cut at ground level. The stems are processed, the outer bark is scraped off and the inner bark is separated and pried off into rolls and dried. The pungent taste and scent of cinnamon come from cinnamaldehyde. Cinnamon is used in the chocolate industry and in dessert recipes. In the Middle East, cinnamon is used in savory dishes of chicken and lamb. Cinnamon is used to flavor cereals and also as a flavoring agent in alcoholic beverages. Coumarin, a component of cinnamon, is toxic to the liver. Consuming large quantities of cinnamon may be harmful.

Vanilla

Vanilla is the most popular flavor in the world, as well as being the second-most expensive spice. (The most expensive is saffron.) Originally from Mexico,vanilla is now grown in many tropical countries. Vanilla planifolia is the commercial variety which is grown at the Belize Spice Farm. Madagascar leads the list of vanilla producing countries, which includes Indonesia, Tahiti, Uganda, India, China, Vietnam, and Costa Rica.

Plants are grown from non-flowering cuttings. Like black pepper, vanilla also requires a supporting structure or trees. The Belize Spice Farm uses madre cacao



trees as the host. Vanilla plants have claw-like aerial roots, which enable them to cling onto the host plant. Vanilla requires close to 50% shade and irrigation. The plants start blooming in less than 3 years. The blooming season starts around December and may go on until April. For commercial production, hand pollination is necessary. The vines that bloomed once do not bloom again. Another interesting feature of vanilla is that the plants that grow straight up on a host plant do not bloom. The vines must be trained to come down and go up again before they touch the ground.

Harvesting starts in September and the fruits are hand-picked when ripe. They go through a curing process that includes killing, sweating, drying, and aerating. During the curing process, vanilla turns black and starts producing the vanilla aroma, which is due to the development of vanilin and to some extent due to about 150 other chemical components. Vanilla extract and vanilla beans are used in confectionaries, ice creams, cakes and also in savory dishes. The many food preparations using vanilla are too numerous to list.

Summary

There are many spices which are not included in this article. The spices that are grown on the Belize Spice Farm can be grown by small scale farmers in most of Belize. Associations could be organized to share the knowledge. Some encouragement from the public sector (like in many countries) may facilitate the growth of thriving vanilla, cardamom, black pepper, nutmeg, and cinnamon farms all over Belize.



Pound Solids System of Payment for Citrus: Redistributing the Benefits

By Luis G.Tzul, Extension Service Coordinator for CGA

The pound system payment for citrus has been implemented for oranges since 2003 and for grapefruit since 2005. It has played a crucial role of rewarding payments for quality. Those growers who deliver quality fruit receive more monies than growers who deliver less quality fruits, i.e. fewer pounds per box of fruit delivered. *Pound solids* is the quantity of solids in a 90 pound box of orange or 80 pounds box of grapefruit. The solids are basically the sugar in the juice but can include other solid materials in juice.

To obtain good pound solids, the right practices begin at the orchard level: taking good care of the citrus trees and the soil, which includes maintaining a good pH close to 6.0 and providing adequate fertilization. When fruits begin to mature, a sample is taken to the factory for analysis of quality. The timing of harvesting oranges and grapefruit at optimum maturity rewards the owner good payments for the pound solids in juice. As soon as the fruits are harvested they must be delivered in less than 24 hours. Once a fruit is harvested the decaying process begins immediately.

Fruit maturity in citrus is guided by the ratio, brix divided by the acidity of juice. A minimum of 13:1 is accepted for oranges and 9:1 for grapefruit. The brix is the measurement of sugars in juice. The acidity is calculated by titration. When ratios are below the minimum, the fruit is considered immature and contain bitter substances. As the ratio improves the sugars become more

pronounced in the juice. When the ratio of the juice is between 15 to 18 the majority of brix values begin to approach the value of 10.0. The ratio is important for maturity of fruit but does not indicate the pound solids in the juice. The brix is a good indicator of pound solids. When juice brix is over 10.0 the probability of pound solids over 6.0 is very high. However one more parameter has to be measured: percentage of juice. A fruit can have high brix but low juice content and the pound solids per box will be low.

When the oranges or grapefruit reach the factory a sample of 40 pounds is taken at random by the pound solids laboratory. Each load is designated with a load ID and linked to the grower who owns the load. The full truck is weighed and then drives up on a ramp where the fruits are offloaded to the factory. As the fruits are conveyed into the factory an automatic sampler collects a sample of fruit and diverts it to the pound solids lab. These fruits are weighed and the juice extracted using the same type of extractor used in the factory to extract the juice from the fruit. The weight of the juice is recorded. A brix and acid readings are recorded. The sample is then extrapolated to a 90 pound box for oranges or 80 pound box for grapefruit to get the pound solids per box, the basis for payment for fruit. At the end of the crop an audited report of the total pound solids produced by the factory is done. Most of the time the factory extracts more solids than the pound solids laboratory because the extractors in the factory are adjusted tighter than the extractors used in the lab and the factory has other machines that extract additional pound solids after the extractor. Any excess is adjusted to reflect payment to growers for the extra or shortage of pound solids.

Continued on page 30



Taiwan Experience On Huanglongbing (HLB) Management



Huanglongbing (HLB) or citrus greening devastated the citrus production in Taiwan in 1951. HLB disease caused great economic loss to the citrus industry by shortening tree lifespan and lowering fruit quality. In order to formulate adequate control measures of HLB, etiological and epidemiological studies and detection techniques on HLB were conducted in Taiwan. Now this systemic disease is generally controlled by integrated measures such as cultivating pathogen-free (PF) seedlings, eliminating inoculum sources and integrated pest management (IPM) - all this for reducing the secondary spread by the insect vector.

Healthy Citrus Nursery Production in Taiwan

In 1973, Taiwan began to produce PF healthy citrus trees with the use of mother trees from Ponkan and Tankan cultivars. These were selected and then pathogens were eliminated by heat therapy. In 1981, the government launched the Developmental and Assistance Program for the citrus industry in Taiwan; it was a three-level system (Foundation Tree, Scion Tree and Healthy Nursery Plant). By 1983 the PF nursery system reduced the prevalence of diseases. The PF nursery system has been properly enhanced through the improved techniques of shoot-tip grafting for obtaining virus/HLB-free citrus foundation stocks. Those materials were used to produce healthy citrus plants under screenhouse, followed by budwood/seedling certification. However, precise and rapid indexing techniques are indispensable for managing a PF nursery system and citrus trees in the openfield. The development and application of molecular diagnostic probes were made for precise indexing techniques including enzyme-linked immunosorbent assay (ELISA), rapid diagnostic strips, polymerase chain reaction (PCR) and real-time PCR (RT-PCR). The Act of Citrus Budwood Certificate, announced by the Bureau of Animal and Plant Health Inspection and Quarantine (APHIQ) in 2004, standardized the indexing, management, and operation procedures. This program is implemented by Chiayi Agricultural Experiment Station of Taiwan Agricultural Research Institute (CAES/TARI), National Taiwan University (NTU) and Taiwan Fruit Marketing Cooperative (TFMC).

Health Management of Pathogen-Free Citrus Trees

Rehabilitation of citrus orchards with PF seedlings has shown vigorous growth and good fruit-setting. The PF citrus trees may begin fruiting as early as 2 years after orchard establishment with good agricultural practices (fertilizing, pruning, IPM, and irrigation). Health management of PF seedlings in orchards in Taiwan is performed with the following strategies: 1) prompt elimination of HLB-diseased citrus trees and alternative host plants, 2) protection of PF trees from vector transmission by chemical control and biological control using *Tamarixia radiate*, 3) protection of orchards with physical barriers such as wind breaks or distance barriers, and 4) chemotherapy with the use of tetracycline (achromycin) injection through an air-pressured injector.

Control of Asian Citrus Psyllid (ACP)

Once the healthy trees are established in the field, it's important to control psyllid in order to prevent HLB infection within the orchard. A control strategy was conducted by studying epidemiology of psyllid and HLB. The pathogen transmission efficiency of Taiwanese psyllid biotype is low. Less than 5% of adults acquired the pathogen after feeding on an infected plant for a one day period, while the nymphs acquired the pathogen at a much higher rate. The percentage of transmission by feeding with pathogen-harboring adults was 12.9%. Because of the low transmission efficiency of psyllid, epidemics occur when the population is high and a reservoir of the inoculum is present. Natural spread of the disease is higher during bud-sprouting since it promotes high psyllid feeding, reproduction and transmission.

In Taiwan, the highest infection rate was late February to mid-March whereas after August rarely occurred. By practicing a control strategy according to these studies, that is, a monthly insecticide spraying program from Feb-Sep and removal of infected trees during Nov-Jan, various famers have successfully controlled the infection rate under 0.2% per year. Adequate insecticides such as Dimethoate, and Confidor were applied.

The International Regional Organization for Plant and Animal Health (OIRSA) has joined forces with Taiwan-ICDF for a regional HLB control project, the object of which is to safeguard the quality and yields of citrus fruits being grown in each of the project countries. This project includes: 1) establishing a seedling nursery and shoot tip grafting laboratory for the production of healthy citrus grafts, 2) organizing workshops and implementing an IPM model, 3) strengthening capacity to identify symptoms and perform PCR detection, 4) monitoring the epidemic of ACP. The Ministry of Natural Resources and Agriculture (MNRA) supports the initiative of Taiwan with OIRSA to manage HLB and welcomes these initiatives to safeguard our local citrus industry in Belize.

For further information, contact MNRA or OIRSA at the National Agriculture Show Grounds, Belmopan.



Energetic Agriculture Mineral Requirements By Bill Lindo

Belize City, Oct 2014: To be productive soil must contain minerals such as boron, calcium, sulfur, carbon, silicon, manganese, magnesium, iron, nitrogen as nitrates & ammonia, potassium, phosphorous, cobalt, iodine, etc. in the right proportion. Neal Kinsey's book *Hands-on Agronomy* states "Good soil structure which as 25% air, 25% water and 50% minerals and humus in essence is based on mineral building blocks." In some parts of Belize the soil lacks phosphorous in adequate amounts for plant growth; the sandy soils of the "pineridge" generally lack calcium. The first task of the farmer is to have a soil test done, then add the minerals missing in the soil.

Minerals can be supplied by compost or commercial fertilizer or a combination of both. However, some forms of commercial fertilizers such as muriate of potash (potassium chloride) used in moderate to high rates on soybeans can kill the germinating seed. Some chemicals, such as glyphosate, used to "*protect crops*" can destroy soil. August 10th 2010 the giant multinational corporation, Monsanto, got a new patent for glyphosate as an *antibiotic*. Their patent states that glyphosate *kills* beneficial soil microbes, notably **pseudomonas genera**.

The better the microbes in the soil work, the better the plants grow. Every plant is unique in its nutritional makeup, its phyto-nutrient complexity, and more importantly, its *microflora symbiotica*. Nutrition is the key. Research in northern Europe and by American Dr. Elaine Ingham has confirmed these facts. And when we look at insects both French biologist, Francis Chaboussau, and American entomologist, Phil Callahan, proved decades ago that insects attack **only** sick plants. Insects' digestive systems are different from mammals' (animals & humans) and, therefore, they cannot eat what is truly healthy and intended for fulfilling the nutrient needs of animals and humans. If minerals are not in balance in the soil, weeds, insects, and diseases can affect the plants, plants can be under productive or weak and lack nutrition, which can result in a lack of nutrition for animals and humans who consume the sick crops or plants. Bad nutrition can cause obesity, autoimmune diseases, heart diseases, cancer, and diabetes. *Drugs cannot cure malnutrition*. As Dr. Arden Andersen, D.O. M.S.P.H., PhD wrote, "The Western world is starving to death on full stomachs."

Remember that to get the potential yields with nutrient-dense elements, vitamins, proteins, amino acids, and phyto-nutrients, the soil must have oxygen, water, minerals and energy all working together as a whole. Farming/ranching is not an industrial process – it's a biological process: microbes in the soil interacting with minerals making the nutrients available to plant roots and enriching the soil to fight plant pathogens.

Soil electrical conductivity (EC) is a measurement that correlates with soil properties that affect crop productivity, including soil texture, cation exchange capacity (CEC), drainage conditions, organic matter level, salinity, and subsoil characteristics. Soil energy is the result of molecular structural change among elements. When energy is low in soils, compost or manure usually does not increase it enough to grow an economical crop; commercial fertilizers such as ammonium sulfate and calcium hydroxide should be applied in quantities depending on soil conditions.

In Belize sugar cane grown under correct conditions, that is, without using poison chemicals, but rather good commercial fertilizers with good compost, and using correct plowing methods, can yield some 100 tons per acre; citrus about 500 boxes per acre, corn some 10,000 lbs. per acre, vegetables about 40,000 lbs. per acre.

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Nontoxic Produce a Reality for Belize Growers Band Together to Meet High Demand for Organic Produce By Bart Mickler



Consumers worldwide have become increasingly alarmed at the incidence of agrochemical poisons in their food because indications are that it is the cause of increases in cancer and other serious diseases. There are many people who simply don't want produce that has been exposed to agrochemicals or other environmental toxins and GMOs.



Some people are turning to organically produced vegetables in Belize because they know that agrochemicals are often not safely used. Washing cannot make vegetables safe because some of the

chemicals are inside the produce. Belize, unfortunately, is not yet sufficiently monitoring the safety of the vegetables in the markets. There is no mechanism to guarantee that the farmer harvests and sells according to safe guidelines. How are consumers to find a nontoxic solution? One of the best ways to assure that food is grown safely and organically is to grow your own.

Greenhouse technology has recently made the commercial growing of organic produce easier and cheaper. In the last few years, small farmers have found they can grow certain vegetables more reliably under greenhouses, thus increasing their profits. These sealed greenhouses naturally decrease the need for agrochemicals and the result is safer produce. The recent availability of natural "green seal" plant medicines has also contributed to organic produce becoming a reality. Many farmers have readily accepted this 'natural' path because of their inherent dislike of agrochemical poisons and their concern for their own families' health.

Consumers in Belize have come one giant step closer to having organic produce as the result of the initiative of a San Ignacio group. On November 10, the Maya Mountain



Learning Exchange initiated a series of monthly symposiums on 'Wellness' at the Maya Mountain Lodge. The first 3 months are dedicated to "Finding Healthy Foods". The first session, attended by 50 consumers, producers, and health food vendors, generated positive commitment by many of the producers to making organic produce available.

Participants immediately organized an organic market place where safe produce could be picked up as well as purchased. There was much enthusiasm for developing a larger buying group before the December symposium. After the meeting, a facebook page, "Cayo Healthy Food", was launched and received over 400 'likes' within 2 weeks. A Facebook group and Google group were launched to broadcast a weekly price list of available products so that consumers could order by email or telephone and pick up their order on Saturdays.

Inquiries and orders are now coming from as far away as San Pedro, Belize City, and Punta Gorda. The advice this Cayo group is giving to other areas is to copy their effort by organizing a buyers' group in their own area and sharing shipping costs. Demand may soon outstrip the supply because people are seriously interested in assuring safe food for their families. The farmers feel sure that any shortages will be temporary and that, given time, they can catch up with the demand.

An increasing number of farmers in San Antonio, Cayo, newly organized as the *San Antonio Cayo Organic Growers Association*, are now motivated to study and comply with organic certification. Their interest has been greatly influenced by the discovery of this new organic buyer market. They are already learning about new ways to control pests and fungi organically, assisted by members of the Belize Organic Alliance (BOA), the Organic Unit at the Central Farm Agriculture Station, and others. Certification is going to take time, but the producers are committing themselves to maintaining the integrity of their product by organizing an organic farmers' group and insisting that their members comply with safe practices for organic growing.

To order from the San Antonio Cayo Organic Growers Association, see details in the advertisement on this page.

BEYOND THE BACKYARD By Jenny Wildman

Ginger Up Your Flower Beds

The garden of my childhood hosted a multitude of colourful plants: roses, cornflowers, geraniums, gladiolus, sweet williams, lavendar, pansies, violets, phlox et al and my favourites were the sweet smelling ones that had nectar which could be sucked and petals that could be eaten. Today I choose to plant only edibles and steer clear of anything allergenic or potentially poisonous. I was therefore very pleased to find that most gingers fall into this realm. Turmeric, galangal, cardamom - all have beautiful flowers and foliage and have valued culinary uses.

When I first encountered Zingibar Zerumbet I was awe-struck and simply had to have some. It was introduced to me as shampoo ginger. The act of squeezing the bulbous head and receiving a generous stream of exotically scented smooth liquid in the palm of my hand had me sold. I imagine this is how Paul Mitchell felt discovering the awapuhi in Hawaii, which led him to create his famous line of hair products. It is mostly grown as a prized ornamental but what a pleasant surprise to find how versatile it is: not only nourishing the hair and body but having nutritional value and medicinal properties. The plant originated in India where the stems and roots are used in cooking to enhance the flavour of meats baked slowly in an underground oven (like pibil). The roots

(rhizomes) are pounded to create a powder said to cure indigestion and toothache, boost the immune system and improve circulation. It is also good for skin conditions such as tinea and ringworm. For stomach ache smash the root and mix with water and drink. This is also a treatment for worm infestation. Crushed and mixed with noni juice, it can be applied as a poultice to soothe sprains and severe bruises. The ingredient zerumbone has been used

effectively in clinical trials for cervical cancer. This can be found in the young stems and shoots as well as the root. In this and other gingers. although you can eat the roots, they are more bitter than that of Zingiber officiale which is the popular ginger. The juice from the blooms makes a very refreshing drink reminiscent of that nectar.

Shampoo ginger is also referred to as wild ginger, pinecone ginger or lanolin lily for the lotion it produces which can be utilized for massage or as a moisturizer. The blooms make impressive additions to any floral arrangement and last for weeks. The scent lingers even when dried and can then be added to potpourri for a room freshener.

I had almost given up trying to grow this awapuhi when I encountered a host of dried leaves and a bare patch of soil with no signs of life. It appears to be slow to start, goes dormant then returns with the summer rains spreading rapidly in flourishing plentitude. The leaves loom to an amazing four feet with abundant blooms turning from lime green to scarlet and hiding discreetly beneath the foliage. As most gingers it likes shade or filtered light, humidity and plenty of water plus a little dolomite to sweeten up its habitat. They do spread so need ample room and should not be planted deeply as the rhizome will be prone to fungal attack.

I am also planting some torch ginger (Etlingera elatior) as the two together make a very showy appearance both outdoors or in floral arrangements. Plus they also are edible conforming to my garden rules. The blooms are eaten in Asian cuisine such as a spicy Thai salad and the copious black seeds make a condiment for the catch of the day. The plants do grow substantially higher than awapuhi so I am planting it behind the awapuhi. Incidentally that Hawaiian word just means ginger so it really encompasses more than the famed hair product.

I also have the other gingers and find the flowers of all to be tasty. Gingers seem to share antiviral anti-inflammatory properties, are high in antioxidants and are fragrant and spicy. Good reason to plant them and enjoy.

Jenny Wildman specarte@gmail.com

The Soils of Belize by District/Region By Harold Vernon hmvernon@yahoo.com

Belize is a very varied geophysical entity. It was formed from uplifting movements of the earth's crust, acted upon by pressure and temperature, the motion of water and wind occurring over a very long period of time. Those processes and events are known as weathering. Soils are formed from the products of the breakdown of rocks made of silica and iron into smaller and smaller units until they become sand which is further broken down to clay particles, the ultimately small physical units. Another type of rock is called limestone which is derived from the skeleton of

marine animals that created reefs. Soils are not monolithic but represent different combinations and admixtures with diverse characteristics ranging from sandy to heavy clay, from fertile to infertile and water-holding to well-drained. There are several types of soils located throughout Belize and these soils are classified according to certain characteristics relating to physical and chemical properties. This article and subsequent articles in this series of articles will communicate information about soils in the country starting in the northern regions, and later describing the central regions and the southern regions. Soils do not correspond to geopolitical boundaries but may influence their boundaries.

The Northern Regions

There are three distinct types of soils located in the northern sub-regions. Soils are all derived from limestone from the Hondo to the New River flood plains. The area is generally flat and is part of the drainage platform of the Belize River Valley. The coastal areas are swampy with many areas of peaty or mucky, saline water saturated soils. Mangrove forests make up a substantial portion along the coast and in most areas brackish water is responsible for the high sea salt (sodium chloride) salinity. Salt water tolerant and colonizing species predominate. Palms, pines and fibrous grasses as well as a few broad leaf species occur with mangrove being the best examples. These soils are not contiguous except along the coast and are referred to as being sodic or severely under the effects of salt water. These soils do not support most crops although high in organic matter. A few areas, if high enough, develop into arable areas such as found on the road to Sarteneja and south to Chunox and Progresso Lagoon. As we move inland in a direction of due west, we start to encounter more elevated soils that are subjected to spillovers from river floods and thus are considered to be young alluvial or flood plain soils. The soils of the Sarteneja Plain, Chunox, Progresso, Little Belize, Caledonia and Copper Bank are loose soils with good capacity for being cultivated to varying degrees.

The most northern part, the Hondo River flood plain and in areas like Patchakan, Xaibe to the border have given rise to soils formed over limestone that range from somewhat to moderately fertile although highly alkaline. Some of these soils have good physical qualities and are classified as <u>entisols</u>, or soils not having highly developed horizons or layers occurring in a flood plain or inceptisols, if of older alluvial materials with some development of horizons.

As we move in a southerly direction in the Corozal District, we encounter soils that become shallow and indistinguishable from the limestone from which they were formed. These soils have very shallow top soils and are highly alkaline since they sit on top of limestone. These soils can be cultivated and in fact are a combination of limestone rocky out-croppings with interstitial areas that can grow grass, family crops such as sugar cane, pasture grasses, or other short rooted species. Tree crops that are not tolerant of high limestone also grow but have comparatively short life spans as they are prone to lime-induced chlorosis. Chlorosis is the result of blocking and crowding out of nutrients and so as the stage of growth changes from juvenile to mature, the plant foliage changes from green to yellow, adult leaves are small and fruiting is of poor quality/quantity. Citrus trees are especially prone but fruiting trees such as papaya and some vegetable crops such as onions and others of the allium family do reasonably well under heavy fertilization combined with eater/corrosion management. Fertilization of these areas should always use acidic residue fertilizers such as ammonium sulphate or other highly soluble forms. Application of heavier doses of phosphates are required, especially the highly soluble forms of phosphates such as mono-ammonium phosphate. Irrigation waters are typically high in dissolved solids and can be a problem with the rapid build up of precipitated salts. Rain-fed crops typically predominate. Organic mulching also assists these soils in development. Next article will discuss the western, south central and southernmost parts of the northern region, that includes most of the Orange Walk District.

Growing Nutritious Foods by NEAL KINSEY Reprinted from ACRES USA www.acresusa.com

If you have seen The Other Side of the Fence, originally made as a short educational movie presented by Dr. William Albrecht many years ago at the University of Missouri, I think you will agree that Dr. Albercht's words of wisdom on food nutrient values

hold true today. Most of the authorities of the time would not accept the idea that just because the crops being grown "looked good," it did not mean farmers and gardeners were growing nutritious food and feed.

I have grown an organic garden in the same place since 1978 using no commercial pesticides and try to work from a safe, natural approach. If that means controlling weeds and grass with a hoe, to me that is better than trying to kill everything else along with the unwanted plants. I do not use commercial N-P-K products because there is no need to do so in order to maintain the levels

Getting to Know Humus

The term humus is not used on most soil audits, but there is the designation, organic matter percent. Humus and organic matter are often used interchangeably.

Humus is made up of decomposed residues which have been completely broken down in the soil by microorganisms. The organic matter or humus terms notwithstanding, when talking about a longterm reservoir for nitrogen, phosphorus, sulfur, boron and zinc, I am not talking about undecomposed residues. This is referring to the humus (that is, completely decomposed organic residues) — without it, the reservoir function wouldn't happen.

Why does humus hold nitrogen, phosphorus, sulfur and boron while clay does not? Because humus is "stronger" than clay. If you could take a handful of clay in one hand and a handful of humus in the other hand, and measure the nutrients, humus has three times the nutrient-holding ability of the clay.

Organic matter contributes to soil productivity in many ways. It improves the physical structure of the soil. It increases water infiltration. It improves tilth, decreases erosion and supplies plant nutrients.

Soil releases needed nutrients to the plant. It releases the nutrients slowly out of the humus over a growing season, cafeteria style. We can speed that up or we can slow it down. The speed up is geared to overuse of nitrogen, basically.

Humus improves the physical properties of soil. It helps hold water better. It certainly adds to the tilth and friability of soil.

Next, it aids in micronutrient nutrition of plants through chelation reactions. It encourages microorganisms in the soil because it serves as a good source of food for microbes. Humus aids in solubilization of plant nutrients from insoluble minerals. This means that it helps break down fertilizers that are on-scene in the wrong form and tied up or complexed.

True humus has high absorption or exchange capacity for plant nutrient elements. That is one of the reasons humus has three times the nutrientholding ability of clay. It can grab and hold the nutrients right on the outside, adsorb them, if you will.

Source: Hands-On Agronomy by Neal Kinsey. Available from Acres U.S.A.

of each nutrient needed in our garden. But if I needed phosphate and had such high potassium levels that compost would do more harm than good and such high calcium that adding rock phosphate would add to that excess and tie up other needed nutrients, then I believe adding P fertilizer from a commercial source that builds the level in the soil would be better than letting the plants suffer — that imbalance would carry over as the feed or food to be provided from what is grown there.

I believe the serious overuse of commercial fertilizers seems to cause the biggest problems, and this appears especially true concerning the abuse from overuse in the case of commercial nitrogen fertilizer sources. But by analysis, thousands of soils that are called "natural" or "organic" are just as lacking and, consequently, no better at supplying the nutrient requirements for us. It may be true that poisons are absent, but that is only one piece in the puzzle to create healthy plants, soil and good nutrition.

From the beginning, the Bible shows that mankind was appointed to be the steward of the soil. Whether one believes the Bible is inspired or not, it is a true principle that can be easily verified by annual testing of soils using the detailed methods developed by Dr. Albrecht. Based on almost 40 years of experience, by testing the same soils in the same way for many years in a row, this is borne out time after time.

Even undisturbed soils, in general, are not what they should be for growing the most nutritious food or feed. They need to be built up, and cared for once they are, otherwise even the most fertile soils will tend to deteriorate if left to survive in a "natural" state. Many will likely vehemently disagree with this thought because they ignore the true science that soil testing can provide. However, it is finding and maintaining the proper balance of nutrients that can make big differences in nutrition. Once that balance is found and achieved, those who think they no longer need to work in order to maintain that fertility will soon lose it. This is not to say that the soils will not produce a crop, but there is more that we need than just to be able to grow something there.

First we need a living, vibrant soil biology, and then we need to avoid the things that will kill it. Be aware that I am not just referring to harsh chemicals, but also actions which rob from the soil biology such as applying so much compost that we starve the roots of micronutrients such as zinc (too much P locks it up) and manganese (too much K blocks it out). An imbalance from organic materials also negatively impacts nutrition. It is the lack of nutrition that comes from not enough of something or too much of something that can hurt us in terms of growing the truly nutritious foods we need.

Dr. Andre Voisin got it right when he showed what excesses will do in his book, Fertilizer Application, but what many fail to realize is that overuse of organic fertilizer can do the same thing as overuse of commercial fertilizer for nutrient values in plants.

I encourage farmers to use natural systems and counter the recommended overuse from those who are there just to market as much as possible for the N-P-K sector. We need to take on the principles of correctly testing and fertilizing for the needs of each individual soil. A serious lack of any nutrient will cause problems, but so will a serious excess. Both extremes result in nutrients that are needed not being supplied to food in the proper amount for the benefit of those that consume it. We need to take on the N-P-K sector, whether commercial or organic in terms of their advocating the excessive or indiscriminate use of fertilizer without regard to soil needs — just sock as much of our fertilizer as you can afford to the plants to grow as much bulk as possible and forget about the soil and its true needs in the process!

This is essentially what is being done any time an effort is made just to use and apply only what fertilizer the crop must have for the desired yield that can be grown on the land in question. Such an approach serves to rob the plants of needed nutritional value.

Continued on page 13

Growing Nutritious...Continued from page 12

How can that be true? Because the soil is the plant's stomach. When the soil is shorted of needed nutrients, the digestive abilities of the plants growing there will suffer. And just as our stomach needs the proper nutrients to correctly digest our food for bodily use, the same is true for plants as the correct nutrition required for top quality also hinges on the digestive ability of the plant's stomach — that is the soil itself. Anyone who fails to realize this is a problem and does not work to properly solve it will also fail in efforts to grow and ultimately provide nutrient-dense foods.

You can only manage that which can be accurately measured. Is it possible to have a high Brix reading and still have a lack of specific nutrients in the crops being grown for food? Harold Pratt was an organic farmer who produced cereal grass and beet tops near Kansas City, Missouri, and he was the first client I knew who advocated the use of a refractometer. He called the sap measurement he got from it "solids in solution." He believed in high Brix and was always working to achieve it. You could run a 22-inch T-shaped soil probe all the way to the handle with ease in his soils. I did this many times, and the wheat roots were still going down deeper than that.

Pratt was not looking for high grain production. He harvested the juice from his green wheat plants to make chlorophyll tablets. Nutrient-dense wheat plants were the goal long before most were familiar with the term. Still he had problems along the way as the nutrients in the soil varied. If the plants have too low of a Brix reading, it is possible to boost the solids by the use of needed foliar applications. But does that boost mean the plants have taken up the same level of nutrients they would have if obtained from a soil with all the proper nutrient levels to feed all the organisms that are required to correctly operate as the plants' stomach? When you short the life in the soil, you stand the greatest chance to short the value of the nutrients in the plant.

Dr. Albrecht continually emphasized the saying, "Study nature, not books." Though he studied many books, what he was saying is that when you see in the field something different than what you read in a book, believe what you see that can be repeated over and over again in the field instead of what the book is advocating. To do that, he needed a "road map" to help find the proper way to grow and produce the best possible plants and crops. To accomplish this he developed the most detailed soil analysis possible and began to employ it, not just to show what fertilizers or soil amendments were necessary to buy and apply for the best yields, but also what was needed to achieve the highest quality.

Whether a farmer, rancher, fruit grower, gardener or nurseryman, as his program is closely studied and the principles properly learned and applied, it becomes apparent that there are no viable shortcuts for growing nutrient-dense foods. Feed the soil what it truly needs and that soil will best provide the plants the nutrients required for full nutrient density.

Neal Kinsey has worked as a soil fertility specialist in Missouri since 1973, with clients in all 50 states and at least 70 other countries. He also conducts training courses for interested farmers and growers as well as on-farm consultations.

Drought Relief for Corn and Forages – Is Zinc the Answer?

By Neal Kinsey

Corn growers are aware perhaps more than most crop farmers about the value of supplying adequate zinc for the crop. Among other uses, zinc is known to be needed for moisture absorption in growing plants. That is, when you don't have enough zinc, it requires more water to grow the same amount of yield because water is lost due to the inability of the plants to take it up in time.

One of the farmers attending our introductory workshop on soil fertility admitted he never had much faith in soil testing to help determine his fertilizer program. But he and all his neighbors had a persistent problem. They all had cows, and every summer during July and August the grass would quit growing and die back due to too little rainfall. When this happened, both he and the neighbors had to feed hay to the cows, and it would happen every summer without fail.

His pastures had decent fertility but were very deficient in zinc; I explained that this was the limiting factor he had not considered, that his soil required zinc to get the most grass growth from the rainfall received. He applied the zinc as a part of the needed fertilizer program. At the end of the next summer after just one year from supplying what the soil test showed to be limiting, including the needed zinc, a letter was included with a repeat set of soil samples. The letter explained that for the first time it had not been necessary to feed hay to his cows in July and August, but all the neighbors still had to do so. They claimed he just got more rain, but the farmer said his rain gauge showed the same amount as the others. He was now observing the benefits of adding sufficient zinc to help his grass better utilize the rainfall. And so long as he kept his zinc levels up, the same thing continued to happen year after year.

For some farms the addition of zinc to the fertilizer program is exactly what is needed; however, on others it would be a waste of time and money to apply it unless certain other fertilizer nutrients required for the zinc to work correctly are also present in adequate amounts. Some farmers erroneously think that if one soil responds favorably to zinc, all the others they have and all of the neighbors will get that response too. So it might be a good idea to take a look at zinc and try to understand when it is most likely to be helpful if drought conditions materialize.

To illustrate how zinc is only a part of the answer needed to resolve a crop's need for maximizing available water to best supply the plants, let's consider tap water in your home. When you want a glass of water, generally "all you have to do" is turn on the tap. That is because the plumbing work has already been done and a pump installed after the well was dug to provide the water to the pump. The relationship of zinc to the plant is more like the part where we turn on the tap to fill our glass; all the rest of the necessary "plumbing" needs to be there first. For example, before we can pull in the water, we have to have enough pipe sunk into the ground to reach the source. For plants, that is like having a deep root system to gather the water. To do that requires adequate calcium levels, because roots grow *through* calcium not to it. So there must be enough calcium in the soil or the roots will not go as deep as they should. Though this is not necessarily the correct numbers for soil tests from other testing laboratories, a 60 - 70% saturation of calcium on the soil test we use indicates sufficient calcium for optimum root growth and the best expected response from adding zinc.

The next consideration in our tap water example is sufficient flow of water that can be pulled from the ground to reach the pump. Using this example for the plants means we need to grow plenty of roots; that is where sulfur (S) and phosphorus (P) are needed. Both S and P in adequate amounts are needed in the soil prior to adding zinc to be of benefit to the crops being grown there.

Sulfur helps plants grow more roots, as much as 1/3 more roots, when it is there along with the other needed nutrients. For corn producing 200 bushels or more per acre sulfur should be at 50 parts per million (ppm) of sulfate sulfur per acre before additional sulfur is not needed. Most crop professionals insist that this is not the case and even if it is, it is far too costly for growing corn. Once the other elements are there in sufficient amounts, analysis of the ear leaf at tassel time will show sulfur as a limiting factor - if not the limiting factor - unless 70 to 80 pounds per acre of S has been supplied from either sulfate fertilizers or elemental sulfur; the extra yield it provides more than pays for the S – but only if the other fertilizers and liming materials needed have been correctly supplied as well. For pasture grasses the minimum recommended is 20 ppm and for excellent results S should be 50+ ppm in the soil on the soil test we use.

Phosphorus is also needed for maximum root development and generally receives far more emphasis than sulfur. However sulfur is an important consideration because too much phosphorus limits sulfur uptake, but also too much sulfur limits phosphorus uptake. The adverse effects of using too much S and too little P is more immediate since sulfur will normally be leached from the soil in a year or less. But the effects of excessive applications of phosphorus on sulfur availability can be both immediate and long-term since it tends to remain very close to where it is placed in the soil. When you have good P levels or apply P fertilizers, just be sure there is adequate sulfur to provide what is needed to reach top yields. We encourage farmers not to take our word for such needs, but rather treat a part of one field correctly and weigh the difference per acre.

Another caution concerning zinc in relation to phosphorus is that an excess of phosphate in the soil ties up the available zinc in those soils. When P is excessive, it requires more water to produce the same potential crop yield. On soils with very low phosphate levels, zinc should be at the minimum requirement of 6 ppm. When phosphate reaches the 'excellent' level, zinc should be 10 ppm, and if excessive, then 20 ppm. Just keep in mind that there are several different ways to test for, measure and report zinc levels in the soil and most will read far lower than the figures from the testing we utilize. So do not try to apply these numbers to another soil test to determine if zinc is deficient or not. If so, you could wind up applying far too much zinc to that soil. On the other hand, we have seen many soil tests that show zinc as adequate when our test shows it is still deficient. Which one is right? The one that provides for the most profit per acre.

Continued on Page 30

The University of Belize at Central Farm and Thiessen's Liquid Fertilizer announce 3-Day Introductory Kinsey/Albrecht Soil Fertility Workshop for Crops & Pasture

Course Instructor: Neal Kinsey

May 11,12,13, 2015 at the Conference Room at University of Belize, Central Farm, Cayo District Based on many years of practical experience working with growers, this course offers valuable information concerning how to improve and manage your farm's soil fertility – from the basics of using and interpreting a soil test to learning how to identify the effect of depleted or excessive nutrients in your soil. Questions about any aspect of the day's topics will be welcome.

Day 1 – Working with Soil Tests, pH and Liming

The Soil Audit – Key Information • Introduction to Soil Testing and Soil Fertility Using the Albrecht Soil pH, Neutralizing Extreme pH • Liming, Evaluating Liming Materials • How Calcium and Magnesium Affect Soils and Crop Production • Soil Compaction and Solutions

Day 2 – Working with Major Nutrients

Nitrogen and Sulfur; Phosphate and Potassium; Sodium; Compost and Manure

Day 3 – Working with Micronutrients

Introducing Micronutrients for Soil Fertility Needs • Boron – Use and Cautions • Iron Requirements • Manganese for Soils and Crops • Copper – Importance and Uses • Zinc for Fertility and Crop Needs

Attendees: Selected students at the College of Agriculture; **a limited number of registrations available to the public.** The cost for the 3-day course is \$600. Bz D, which includes course notebook, lunches and refreshments at morning and afternoon breaks. For registration contact: David Thiessen of Thiessen's Liquid Fertilizer at **670-4817** or email: **thiessenliquid@gmail.com**

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

Randy Vogeler, Garrison, Iowa

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BEL-CAR Makes Belize's 1st Bulk Corn Export

Belize's first bulk export of corn was made late in October of 2014, after Bel-Car signed a contract with a Trinidadian company for 2,800 Metric tons of corn. The cost of producing corn in Belize exceeds the Chicago Board of Trade (CBOT) prices. However, the Trinidadian buyer who purchased this corn paid more than the CBOT price as they realize that Belize's corn is of higher quality, which will more than compensate for the higher cost.

The 2800 M T (equivalent to 124 of 50,000 lb container loads) shipped from the port of Big Creek in Southern Belize. Bel-Car brought their own portable augers

for loading, and had 30 Spanish Lookout trucks delivering the corn from Spanish Lookout to the port on a 24 hour basis until the job was completed. Bel-Car's Paul Penner acknowledged, "loading a bulk vessel without the right equipment is a challenge. We managed to load it at that time. But in the future a better conveying system will need to put in place."

In late January, the Mennonites had an opportunity to hone their bulk loading skills, as they had a crew again in Big Creek Port, again working 24 hours per day, assisting Citrus Products of Belize Ltd. (CPBL) load citrus pellets. Acquisition of bulk loading equipment by Big Creek Port would open doors for many ag sectors.

Rice Production in Spanish Lookout

Spanish Lookout rice producers report that there is more than ample rice supplies for the coming year. Although it was a dry year for them,

yields were considered average and similar to last year's. There was somewhat of an issue with the Spinki mite, because of the drought. The harvest of 190,000 bags of paddy rice produced roughly 139,785 milled bags (60%). Average yield was 2681 lbs/acre (milled). The rice acreage remains stable, and slowly farmers are converting to flooded or irrigated fields.

THE BELIZE GRAIN GROWERS ASSOCIATION (BGGA) SUPPORTS THE USE OF BIOTECH OR GMO CROPS IN BELIZE

What is a GMO?

GMO, which stands for Genetically Modified Organism, is defined as an organism in which the DNA or genetic material has been altered in a way that is not considered natural breeding. It includes the transfer of selected individual genes from one plant or organism into another. Other terms used to describe this technology are "genetic engineering", "modern biotechnology" or "recombinant DNA technology". A new plant produced by this technology is usually referred to as a biotech plant (eg. biotech soybean or biotech corn) or as a GM plant (eg. GM papaya or GM rice).

Cassava with high protein content and resistant to Cassava Mosaic Virus being produced in Africa

GMO Technology is used to produce:

- i. Food for a growing world population. Eg. GM cassava with high protein content, GM rice with higher vitamin A and GM soybean with high healthier omega 3 oils all aiming to help feed the growing world population while addressing common malnutrition problems;
- ii. Animal feed eg. GM corn and GM soybeans are used in the USA, Canada, South America, the Caribbean, China and many European countries to feed chickens, pigs, cattle, dogs and cat;
- iii. Medicines and vaccines to treat diseases in humans. Examples of GM medicine produced for humans use are: insulin used for diabetes, gastric lipase used to treat cystic fibrosis, plasminogen activator used for heart attack and stroke patients, Hepatitis B vaccine, and GM flu vaccine called Flublok.
- iv. GM insects to control or reduce insect transmitted diseases. New developments include the use of GM mosquitoes to control dengue and this is being used commercially in the Bahia region of Brazil and more recently Panama;
- v. Vaccines and therapeutics for animals. Over 60 animal therapeutics have been developed and 13 GM animal vaccines have been approved for use in the US. Examples include vaccines for Newcastle disease, bovine and avian salmonellosis;
- vi. Industrial enzymes used in the food and textile industries such as rennin used to produce cheese, amylases and invertases used in food processing, lipases used in laundry detergents, cellulases used in the treatment of leather and many others.

Which is the first GMO product produced and marketed in the world?

The first medicine produced using GMO technology is 'human insulin' which was developed by Genentech company which began marketing 'human insulin' in 1982.

THE BGGA BELIEVES FIRMLY IN ADDRESSING FARMERS PROBLEMS WITH TECHNOLOGY AND NOT SENTIMENTAL IDEOLOGY

The Belize Grain Growers Association P.O. Box 599, Spanish Lookout

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A.		ricultur	e Price	s at a Glance- \$\$	Ś	S	FEB 2015
A-B denote and t	bull bull	he difference betwee s or small amounts Prices intend	on 1st preference & . Trend (H) means on being farm gate	t 2nd preference and sometimes between w Higher over last 30 to 60 days (L) Lower (the in Belize dollars - usually price per lb	vhol (S) S	esale & retail iteady.	
	⊢	4	ß		⊢	۷	В
BELIZ	王 王	CATTLE		GRAINS, BE	AN	IS & RICE	
Young strs. & bulls - 750-1100 lbs	т	2.00 - 2.15	1.60 - 1.95	Belize yellow corn, bulk (Spanish Lookout)	S	N/A	.2122
Cows & heifers for butcher	т	1.75 - 1.85 heifers	1.30 - 1.55 cows	Yellow com/local retail (low volume)	S	.265	
Heifers for breeding 500-800 lbs	Т	2.00 - 2.35	1.80 - 2.00	Belize white com, bulk	Z	.31	.27
Young grass cattle - 350-650 lbs	Т	steers 1.95 - 2.35	heifers 1.50	White corn/local retail (low volume)	т	.39	.35
U.S.	U U	ATTLE		Guatemala yellow corn price/Peten	Г	(Q147 /quintal) BZ\$.4	8
U.S. price - corn fed - 1000-1200 lbs	-	US\$ 1.53		Guatemala white corn price/Peten	_	(Q 140 /quintal) BZ\$.4	5
U.S. price - feeders 600-800 lbs	-	US\$ 2.14		US com	т	US\$ 3.86 / 56 lb bush	e
BELI		HOGS		US non-GMO yellow com	т	US\$ 5.60 - 8.40 / 56 II	o bushel
Weaner pigs - 25-30 lbs - by the head	S	85.00 - 120.00		US organic, yellow feed grade corn (USDA)		US\$ 10.50 - 13.50 / 5	6 lb bushel
Butcher pigs 160 - 230 lbs	S	2.15	1.95	Belize soy beans	-	.50	N/A
BELL	Z	SHEEP		US soy beans	т	US\$10.64 /60 lb bus	Jel
Butcher lambs	포	3.00	2.00	US organic, feed grade soy (USDA)		US\$ 23.00 - 26.50 / 5	6 lb bushel
Mature ewes	S	1.75	1.50	US organic, food grade soy (USDA)		US\$ 28.00 - 30.00 / 5	6 lb bushel
BELIZI	Ш	CHICKEN		Belize milo		None Available	
Whole sale dressed	S	2.41		Red kidney beans	_	1.10 -1.25 farm price	
Broilers - live per Ib	လ	1.23		Little reds & black beans	လ	1.25 - 1.30	
Spent hens per 4 lb bird	S	3.00 (100+ birds)	4.00 (low volume)	Black eyed peas	т	.6575	
o	E	RUS		Paddy rice per pound	S	.4053 farm price, d	ied
Oranges per 90 lb box-lb. solid basis	Н	10.9525/box, 1.856	4 pps	SUGAR	/HC	DNEY	
Grapefruit - per 90 lb box	S	9.8690 / box (2.4248	3 pps) est final	Sugar cane, ton	т	estimates 2014/15 cro	pp: \$66.62
C	Ä	SAO		Bagasse		pending agreement	
Cacao beans (TCGA) /lb	S	2.75 dried fermented		Honey per lb (Cayo)	S	2.50 (approximately 1	2 Ibs/gal)
Cacao beans (TCGA) /lb	S	1.10 wet beans		SPECIAL F	AR	M ITEMS	
US Cacao beans, New York, metric ton	-	US\$ 2,968.84		Eggs - tray of 30	т	4.87 farm price	
				WD milk per lb to farmer	Г	contract .52; non cont	ract .52
				Raw milk (farmer direct sales)	S	8.50 gal (5 gal + 8.00	gal)
***These prices are the	e be	st estimates only fron	n our best sources a	nd simply provide a range to assist buyers a	nd s	ellers in negotiation	. ***

FEB. 2015 BelizeAgReport.com 19 Harvesting Ag News from All of Belize

Rabies – A Serious Consideration by Dr. Joe Myers D.V.M.

On 28th September every year, the world unites in the fight against rabies by celebrating World Rabies Day, a day of activism and awareness. It is the global movement to put an end to the suffering caused by rabies. The World Organization for Animal Health (OIE) states, "Rabies kill around 70,000 people a year and more than 95 % of human cases are caused by bites from infected dogs." The last human case in Belize was in 1989 when two children died after playing with a dog and her puppies.

Rabies is a viral disease that causes acute inflammation of the brain in humans and other warm-blooded animals. The time period between contracting the disease and the start of symptoms in humans is usually one to three months; however, it can vary from less than one week to more than a year.

The Veterinary Association of Belize encourages all veterinarians in Belize to not only celebrate World Rabies Day but to conduct yearlong activities in Belize's fight against rabies. People have died of rabies in Belize. Dogs and cats have died of rabies in Belize. Farm animals have died of rabies in Belize. Wild animals have died of rabies in Belize. Rabies is an endemic disease in Belize with both urban and sylvatic cycles having been detected. Although good control is done of the urban cycle through continuous vaccination of dogs and cats, the sylvatic cycle is more difficult to control. Both the vampire bats and the grey fox are reservoirs of rabies. This is one of the many reasons why wild animals should not be kept as pets. Where rabies constitutes an occupational hazard (veterinary services, wildlife conservation, public health) it is mandatory that all personnel receive pre-exposure prophylaxis (vaccination) given the risk when dealing with animals.

In Belize as urban rabies is well controlled, most cases of rabies occur as bovine paralytic rabies transmitted by the vampire bat. Rabies in cattle has been reported in all six districts. According to the OIE vaccinating 70% of dogs allows rabies to be eradicated from a given endemic area. Annually the Public Health Department of the Ministry of Health (MoH) carries out country wide vaccination for dogs above 3 months of age, free of cost. The Humane Societies and other groups such as the US Army Missions also conduct periodic rabies vaccinations. Vaccines are also available at all veterinary clinics. The average price for vaccine dose is only \$ 2.50 USD. It is of vital importance that all vaccinated animals be identified and issued with a certificate of vaccination

Rabies is an OIE-listed disease. It is a notifiable disease in Belize; thus it is mandatory for the private practitioners to inform the Belize Agricultural Health Authority (BAHA) of any suspect cases. Import requirements for dogs and cats into Belize include current vaccination for rabies by a licensed veterinarian of the country of origin. Large animals are kept under mandatory quarantine in the country of origin and also upon entering Belize – a total of 60 days. Pets (dogs and cats) that are not of age are kept under house quarantine until they can be vaccinated. It's important to note that the vaccine takes at least 14 days to become effective.

Rabies cannot be diagnosed only by clinical signs even if there is a very strong suspicion. Because it causes swelling in the central nervous system, mainly the brain (encephalitis) it can be confused with other diseases that have a similar effect. Therefore there is the need for laboratory confirmation and/ or differential diagnosis and the sample of choice is the brain. The OIE further warns, "the disease can be transmitted to other animals or humans via saliva of an infected animal, sometimes even before the onset of clinical signs in the infected animal, constituting an insidious threat to anyone coming into contact with the animal."

Notifications of suspect rabies cases are investigated by BAHA, the MoH and the Ministry of Agriculture (MNRA) at no cost to the animal owner. A history of the animal determines the steps to be taken, i.e., whether it is isolated and kept for observation or euthanatized and the brain sent to the veterinary services laboratory in Panama. The MoH will determine human exposure to the virus. If warranted (bite, scratch, saliva) a post exposure regimen will be initiated which consists of 5 vaccines. Laboratory-confirmed cases in cattle trigger control response which includes vaccination of herd, vaccination of susceptible animals in protection zone and vampire bat control at farm and roosts (caves).

Reports can be made to BAHA's hotline (605- 2100) or to any BAHA office, MNRA office or MoH hospital/clinic..

BLPA UPDATE

By Alistair Macpherson, CEO of the Belize Livestock Producers Association

Over the last couple of months there has been much going on within the Belize Livestock Producers Association (BLPA) and our industry, and for once all seems to be good news.

The BLPA has embarked on producing a 10 year plan, a long term strategy with defined goals for ensuring the sustainability,

growth and improvement of our industry at all levels. It is necessary to have this type of strategy in place when we talk to potential partner organisations who will provide technical and financial support for projects we may want to run in the future. Basically these donor organisations want to make sure that they are dealing with an organisation that "has a plan" and has certain administrative, financial and planning systems in place and has the capacity to run these projects whether it is a small artificial insemination (AI) project for farmer groups or running the Belize livestock registry (BLR).

At the beginning of September the BLPA held a consultative meeting with around 40 stakeholders from the cattle industry along with some representatives of various government departments and other interested parties at the George Price Center in Belmopan. The meeting was well attended and lively and diverse dialogue was held. The meeting was hugely constructive in that many topics were discussed and we were able to get a better understanding of where and how the membership wanted our industry and our association to be headed. Many of these points have been included in follow up conversations and meetings and are being included in the long term strategy and plan. Once our strategic plan is in place, we will be able to write concept notes to present to the various organizations and hopefully we will be able to start with some projects, all of which will help strengthen the industry and BLPA.

Also in September, the Ministry of Natural Resources and Agriculture (MNRA) announced that the much awaited and fought for agreement with Guatemala has been made whereby we can now legally pass cattle under 30 months of age into Guatemala to the formal market there. At the time of writing negotiations with private buyers are taking place that will see the first truckloads of Belizean cattle pass through the western border at Benque. This is great news for the whole cattle industry as it now means that we no longer have to rely on an informal trade with our neighbours and there is further hope that the industry will thrive here in Belize. It also means that if you go to the bank for a loan against your cattle business, you can tell the bank with hand on heart and say, "Yes there is a formal market now in place, and we can export our cattle to this market. " This should give the banks extra confidence to loan money as we are no longer reliant on an informal trade to expand our enterprises.

The credit unions and the Development Finance Corp. (DFC) have already put new plans in place to cope with and satisfy the extra demand they have from customers who either want to get into cattle farming or want to expand their operations. All this points to a positive time ahead for all you existing and potential cattle farmers.

BLPA – An organization that's MOOOOOOving forward!!

Nitrogen uptake or assimilation is essential to the survival, growth and reproduction of all plant species. In general, plant nitrogen requirements are met by root uptake and in some cases leaf and stem absorption of ammonia (NH₂) and/or nitrate (NO₂) forms of nitrogen. However, plants don't always get these forms of nitrogen they need directly due to the competition for ammonia and nitrate uptake with soil microorganisms, volatilization into the atmosphere and soil leaching. Conversely, soil ammonia levels are replenished via the process of ammonification or the breakdown/decomposition of nitrogen-containing plant and animal tissues. However, over the course of geologic time, nitrogen losses due to the combination of nitrification/denitrification by microorganisms have been significantly greater than nitrogen inputs due to ammonification, resulting in approximately 80 percent of the atmosphere consisting of dinitrogen (N₂). Consequently, in the rooting zone of many soil-plant systems across the globe, nitrogen availability is often the most limiting factor in terms of overall plant growth and seed production. Hypothetically, the balance of nitrogen in the atmosphere compared to soil-plant available levels of ammonia and nitrate could have continued to shift to levels greater than 80 percent if not for the completion of the nitrogen cycle via the process of biological nitrogen fixation or the conversion of dinitrogen back to ammonia. The following paragraphs describe 1) the kinds of organisms that are capable of nitrogen fixation (diazotrophs) and their general distribution and 2) estimates of their annual inputs and potential to curb the current increase in the application of synthetically manufactured nitrogen-containing fertilizers.

Diazotrophs include some species of bacteria, blue-green algae, and actinomycetes that are genetically capable of synthesizing the nitrogenase enzyme (a protein). Consequently, via nitrogenase activity they can supply all their nitrogen requirements by catalyzing the following reaction: $N_2 + 8H + energy = 2NH_3 +$ H_a. Diazotrophs can be grouped according to oxygen use as anaerobic (no need for oxygen), aerobic (requiring oxygen) or facultative (can grow with or without oxygen). They can also be grouped as photosynthetic or non-photosynthetic. However, in terms of their importance to plant growth, they can be grouped as free-living, or symbiotic. Under symbiotic conditions the plant host supplies the diazotroph with some or all energy needs and in return the plant host receives ammonia. Symbioses can be further divided into associative or intercellular symbioses. Associative diazotrophs remains on or near the surface of the host plant including roots, stems and leaves. Intercellular symbioses occur where the diazotroph is enveloped by host plant cells usually root cells resulting in the visible growth of root nodules ranging from 1 to more than 100 mm in diameter and persisting from days to years. Symbiotic diazotrophs play an important role in the production of many agricultural crops,

especially the intercellular legume/bacterial rhizobia symbioses. However, many associative diazotrophs occur in the rooting zone of agriculturally important grasses including wheat, corn, sugar cane and other forage species. The real beauty is that diazotrophs are likely components of all ecosystems including both terrestrial and aquatic and 100 percent of the fixed nitrogen is incorporated into living tissue. Furthermore, plants capable of symbiotic nitrogen fixation generally have tissue nitrogen levels greater than non-nitrogen fixing species. Consequently decomposed tissues containing symbiotically-fixed nitrogen have significantly higher rates of ammonification which subsequently benefit surrounding non-nitrogen fixing plant species.

Estimates of global rates for biological fixation of nitrogen vary greatly from 5 to 200 million metric tons per year, including estimates for total terrestrial fixation of 139 million metric tons per year and 36 million metric tons for aquatic systems. Certainly actual rates will also vary from year to year due to natural variations in climate especially precipitation for terrestrial fixers, temperature for aquatic systems and the availability of other essential nutrients, especially phosphorus. Conversely, the conversion of native plant communities to agricultural land use and application of nitrogen fertilizers, including the predicted use of over 100 million tons in 2014, to crops species has a significant negative impact on the global rate of biological fixation of nitrogen, despite the widespread planting of leguminous crop species. These negative impacts can be reduced by more efficient use of nitrogen fertilizer that would result in a much higher uptake of the applied nitrogen by the target crop because nitrogen fixation rates by all nitrogen fixers is significantly reduced in the presence of fertilizer nitrogen. The global rate of nitrogen fixation by agricultural crops and agroforestry systems may also be increased by inoculating these species with more efficient strains of the diazotroph including both associative and root nodule forming symbioses.

Biological nitrogen fixation will always have a significant role in the global N-cycle and an especially effective role as farmers learn to curb excessive, inefficient and environmentally damaging use of nitrogen fertilizers. The bottom line is that life on the planet as we experience it would not be possible without the past, present and future expression of biological nitrogen fixation.

Comments are welcome at stephen.zitzer@gmail.com

Editor's Note: Stephen Zitzer has been a plant ecologist for the past 30 plus years, having conducted research in many diverse plant communities in North America. He relocated permanently to Belize 15 months ago and resides on his 35 acre property near Calla Creek, *Cayo, which he manages for biodiversity and sustainable food production.*

Growing Carob in Belize

By Mary Susan Loan

Carob is actually a shrub, but usually considered to be a tree because it can grow to be fifty feet with a broad spreading canopy of dark green, glossy, leathery leaves. Although not well known in Belize, cultivation of carob has potential to be successfully grown here. The prevailing advice is: "anywhere citrus is grown, carob may be grown". Carob (Ceratunia siliqua), is a leguminous evergreen shrub/tree which is a member of the Fabaceae

(pea or legume) family. The versatile trees are grown for their pods, seeds and wood, enjoyed as a showy ornamental shade trees, or pruned to form a dense screening hedge. Wood of the tree is hard and close-grained. It is prized for turnery (objects made on a lathe), furniture and cabinet wood. As a fuel it burns slowly and creates an excellent charcoal. Carob trees are fireresistant and are sometimes planted around homes in areas where there is a high risk for fires to help protect homes and property.

Trees have pinnate leaves and numerous small red blossoms which develop in the female trees into edible oblong pods. Carob is native to the eastern Mediterranean; it is known as 'algarrabo' in Guatemala. It is also commonly known as "Saint John's bread", as carob was the "locust" which sustained Saint John the Baptist. Carob later became known as locust, or locust bean, a name which has been attributed to many leguminous trees. Carob has become known and used as a substitute for chocolate around the world.

The origin of carob dates back to at least five thousand years. It has been cultivated since ancient times in the Mediterranean region and was well-known to the early Greeks. The trees reportedly grew wild in the Levant region and continue to grow wild in unsettled areas of the Mediterranean. By the 19th century carob pods were exported to Russia and Central Europe where they were sold on the street to be chewed as "sweet meats". Carob trees were used to reforest the slopes of the Apennines in Italy. Spanish missionaries are responsible for introducing carob to Mexico and Southern California by importing over 8,000 seedlings. By 1859 many more carob trees were distributed from seeds imported from Israel to warm climate zones of the Americas.

Carob seeds removed from the pod may be directly planted or started in pots or gardening bags. Fresh seeds germinate quickly especially if chipped and soaked in water. A well-cared-for seedling may bear fruit in six to eight years. Cuttings from fruitbearing trees may bear fruit in as few as three to four years. When planting, it is important to give trees lots of 'elbow room' allowing at least thirty feet in every direction around the trees. Carob trees grow easily and well in warm temperate and subtropical areas. They survive cold to 20 degrees F and heat to 122 degrees F. Trees grow in widely divergent soils and tolerate humid coastal weather and some salt. Trees do not require fertilizer and are quite pest-resistant as well. Considered to be xerophytic (drought-resistant), carob trees grow deep root systems and are intolerant of water-logged soil. This species is predominately dioecious, having separate male and female trees; however it is not uncommon to have both male and female characteristics occur in some carob populations. It takes at least one male tree to fertilize approximately twenty-five to thirty trees. Some commercial growers graft a male branch to a few female trees in an orchard to pollinate trees without taking up the space of a male tree. Trees are pollinated by wind and insects.

Reddish-brown carob pods come in many shapes and grow to be four inches up to a foot long; when ready for harvest each pod may contain up to fifteen seeds. During the first years, trees produce about five to ten pounds of pods; by year twelve, one hundred pounds; and following a few decades of growth, up to two-hundred fifty pounds. Full mature trees can produce up to three thousand pounds of pods in a season. Trees are known to be productive for up to one hundred years. Trees grow slowly in the first year, then are rapid growers. It takes a full year for pods to develop from green to ripeness on the tree. Unripe pods are green and extremely astringent. Harvesting should be done during a dry spell as the pods are susceptible to ferment and mold when damp. An opened ripe pod is filled with a sweet, delicious, soft, semi-translucent, pale brown pulp which is said to vaguely resemble the aroma of Limburger cheese due to the 1.3 % isobutyric acid content. Flowers and pods of the carob tree are cauliflorous; that is, they often grow directly from the limbs, trunk and branches of the female tree. Several animals eat the ripe pods and help distribute the seeds. Deer, squirrels, rats, bats and gophers especially enjoy chewing the bark and pods.

Ripe carob pods are deseeded, dried, generally in the sun or lowheat oven kilns, then ground to make carob powder, which is used as an ingredient in beverages, confections, baked goods and ice-cream. Carob powder can be substituted for cocoa in the same proportions in a recipe with an adjustment of lowering the amount of sugar as carob has natural sweetness. Carob seeds are dark brown and uniform in shape, resembling watermelon seeds. They are hard and require grinding to be processed into locust bean gum, the thickening and emulsifying agent used in salad dressing, and other foods. Seeds were once used as a size and weight measurement for gold and for sizing diamonds and other precious gemstones. One carob seed equals one carat.

Carob is highly nutritious in the pods and seeds. Seeds constitute ten to twenty percent of the pod weight. Carob is often used as an energy-rich feed for animals. Pods are relished by horses, cattle, pigs, goats and rabbits. Ground pods contain tannin which can interfere with protein absorption so should be used effectively as only about ten to twenty percent of diet as a nutritious supplement. Carob powder and syrup is naturally sweet. It is a good natural source of protein and calcium and is rich in iron, phosphorous and fiber and trace minerals. Carob has been used since ancient times as sustenance for humans and animals during times of famine. Carob also has therapeutic uses. One tablespoon of carob in a cup of liquid is said to help quell symptoms of diarrhea. A syrup is made from the sweet pods which is an effective cough and irritated throat remedy. Singers have chewed the pods to sooth their throats. Seeds have been ground, roasted and used as a coffee additive or substitute. Some claim carob has aphrodisiac properties.

Although Spain, Italy, Morocco, Portugal and Greece are the top carob producing countries, Belize and Central America have successfully grown carob trees. Trees are available in Belize at various nurseries, including All Fruit Nursery a few miles outside Belmopan off the Hummingbird Highway in Springfield. The full commercial value of carob has yet to be realized in Belize.

Management System for Sugar Industry – A Giant Step Forward

Since its activation in 2009, the Sugar Industry Research and Development Institute (SIRDI) has made great strides in assisting the cane sugar farmers to improve the quality and quantity of sugar cane. But with over 5000 farmers, hundreds of

thousands of acreage in two districts (Orange Walk and Corozal), 8 varieties of cane in commercial production, and only 4 technical field extension officers an obvious requirement was a management system. That need is being met with Sugar Industry Management Information System (SIMIS) under the leadership of Gregorio Canto. When operational, the system will be a comprehensive data base of sugar cane fields, indexed in detail by geographic location. The system will allow farmers and field extension officers to (1) monitor soil fertility, plant growth, pests, weeds and disease control, and water quality and drainage, (2) coordinate schedules for planting and harvesting, (3) assist farmers with record keeping, (4) identify common problems to be addressed, and (5) assess unique problems.

The limited staff of SIRDI, headed by Marcos Osorio, is augmented by experts who hold classes and field days to assist farmers in improving the quality and yield of cane. And improvements have been made. The demonstration plots of the Belize Sugar Cane Farmers Association (BSCFA) and SIRDI were proof that farmers could double yield. Mr. Lamberto Patt from San Narciso Branch increased his yield from only 18 tons of cane per acre to 36 on the same land, using the effective cultivation and replanting practices he learned from SIRDI and the experts.

Another program instituted by SIRDI to augment the effectiveness of their limited staff of technical officers is the Key Farmer Program. The "sugar belt" was divided into 4 geographical zones; key farmers in each zone committed to pass on to the other farmers in their zone the knowledge and practices they learned and adopted.

The impetus for improving the yield and quality of sugar cane (and thereby increasing revenue) came from two primary incentives: (1) the regulation that limited the production and sale of beet sugar and high fructose corn syrup in Belize's traditional export market, the European Union, will be lifted in October 2017 which will cause the price of sugar cane to fall and (2) the factory introduced a relative quality-based cane payment system. The Cane Quality Improvement Program (CQIP) implemented by the Sugar Cane Production Committee

(SCPC) and supported by both the farmers and the mill added to the positive results. Improvements in both equipment and practices at the mill have led to improved synchronization between

the supply and demand at the mill as well as production quality and increased sugar extraction. Sugar content is lost when it is burned and not delivered within 24 hours to the factory; so scheduling is important to maximize quality and quantity. In addition farmers are following recommendations for pre-harvest assessment of cane maturity and cutting and assembling bundles of cane to deliver fresh, mature, clean cane.

As of June 2014 Tower Hill Factory was ahead of its target with the following improvements: metric tons cane ground increased from 941,585 last crop to 1,113,192; tons per day average grind rate increased from 6,196 to 7,320; tons of sugar produced increased from 100,260 to 113,839 and tons cane/tons sugar (TC/TS) improved from 9.28 to 9.69.

Belize River Valley Ltd. (formerly Tennessee Farms) Hosts Discussion on Sustainable Farming Center for Belize in Burrell Boom

By Mitchel Bell

Belize River Valley, Ltd. (BRV) of Burrell Boom, Belize organized a meeting on January 9, 2015 to discuss various agro-ecological principles that could be applied in Belize.

Over forty people from thirty different groups attended the meeting this morning. Representatives from numerous Belizean agencies participated including the Ministry of Natural Resources and Agriculture (MNRA), Ministry of Energy, Science, Technology and Public Utilities, the United Nations Development Program, the University of Belize, the University of the West Indies, the Republic of China - Technical Mission, the Statistical Institute, the Belize Marketing Development Corp., the Caribbean Agriculture and Research Development Institute, the Pesticide Control Board, the Food Safety Service, the Belize Agricultural Health Authority, the Central Farm Research and Development Center, OIRSA, the Inter-American Institute for Cooperation and Agriculture, the Belize Cancer Society, the Caribbean Alliance Cooperative, the Coastal Zone Management Authority, several private NGOs, local farmers and media.

The featured speaker at the workshop was Dr. Miguel Altieri of the University of California Berkeley's agro-ecology program. Dr. Altieri provided an overview of the principles underlying agro-ecological development and presented numerous examples of sustainable farming practices that have endured since the dawn of agriculture. His worldwide involvement in assisting farmers

allows him to share successes across many cultures. He showed amazing "before" and "after" pictures of projects in Peru, China, Cuba and Mexico with a special emphasis on 'chinamapas' used by Mayan cultures.

Fay Garnet, from MNRA at Central Farm described the successes of the agroecological project she has been directing for the past year in Cayo. Like Dr. Altieri's projects, she said the program emphasized principals of agroecology instead of procedures to allow farmers to understand the importance and effects of good farming practices.

BRV owns and operates the **Ms. Fay Garne** 6,344 acre farm that was

formerly the site of Tennessee Farms and earlier the Mussel Creek Rice Station. The original rice station was a large-scale mechanized rice farm that served as a demonstration site and provided the proof of concept for Belize's now well-established rice industry.

The site has remained mostly unused for over thirty years except for a brief period of cattle ranching and the owners envision a multi-use facility focused on several scales of farms, called modules that offer practical examples for small and medium sized farms. Important components of the farm plan that promote bio-diversity are conservation areas, agro-forestry practices, eco-tourism and public outreach to foster sustainable farm practices.

For more information on agro-ecology, see Dr. Altieri's website: www.agroeco.org

Find an interview with Dr. Altieri at <u>http://www.mindfully.org/GE/GE2/Miguel-Altieri-Agroecology.htm</u>

"Peasants produce 50-75% of food consumed by the world's population, but use: 25-30% of the land, 30% of the water used in agriculture and, 20% of the fossil fuels used in agriculture."

Dr. Miguel Altieri

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Workshops were held for over 20 teachers in Belize City on 11 & 12 August, and similar workshops were held for over 20 teachers in Dangriga on 13 & 14 August to help them bring back *garden-based learning* to our Belizean classrooms. Approximately one half day was spent on each of 4 general subject areas: Administering a School Garden Program, Agricultural Practices, Hands-on Agriculture, and Integrating Garden-Based Learning into the curriculum.

Yvonne Codd, Health and Nutrition Officer for MOE organized the workshops, and explained the history of school gardens in Belize, and some of the many benefits of gardenbased learning: improved nutrition, a teaching tool that can be used to improve the learning of science and other academic subjects, vocational education, life skills, and more.

Mark Miller, Executive Director of Plenty Belize shared information gained from the 53 primary schools in Toledo with regards to managing a school garden program, determining the vision for a school garden, and the importance of setting up a committee of teachers, parents, students, community members, and supporters to plan and manage the garden site.

Ministry of Agriculture staff, (Mr. Abraham Gonzalez in Belize City, and a team of research officers from Central Farm, Gary Ramirez, Christobal Teck and Anita Ochaeta at the Dangriga workshop) presented on urban gardening and many of the basics of organic gardening. The training agenda consisted of a power point presentation in:

- Seedling preparation
- Soil preparation
- Planting guide for different crops
- Good farming practices (crop rotation, integrated pest management, repellent crops etc.)
- Identifying beneficial insects around the garden
- Pest control methods using organic repellents

A practical was done with teachers on:

- Soil preparation (soil mixes)
- Germination test
- Preparing seedling (sowing seeds in seedling trays)

Recycle materials, such as plastic bottles and carton boxes from juice and milk were displayed and demonstrated for use in planting. Emphasis was on the use of repellent crops and herbs in a garden. Presenters made it clear that it is not appropriate to use pesticides and herbicides in a garden for children, and so discussed integrated pest management with a focus on the preventative stages.

All of the panelists assisted in the hands-on part of the

workshop, which focused on composting, planting of seeds that will later be transplanted, and direct planting.

Mr. Augustin Lara, Teaching Principal at Santa Anna Government School, Toledo District, presented on integrating the school garden into the curriculum. Using his over 10 years of school gardening experience, he led discussions and group lesson planning exercises showing how garden-based learning can be part of the regular lesson preparation of the teachers.

Ministry of Education, with help from Ministry of Agriculture, is setting up 3 covered structures at St. Martin's School in Belize City, Sacred Heart School in Dangriga, and Belize Rural Primary School in Belize River Valley for school garden projects.

Dairy Products at Home Making Cottage Cheese By Deborah Harder

This is the first in a series aimed at instructing readers in the simplest ways of processing dairy foods at home. Whether you are interested in keeping your own milking cow, or are able to procure fresh milk from a neighbor, you may be surprised how easy it is to produce your own yoghurt or cheeses. A theme of this

series will be how to do these things in tropical weather without refrigeration, as many Belizeans do still live without electricity. Others living a more modern lifestyle may be glad to learn that it is possible to live without refrigeration even when using milk, the most perishable of foods.

Thankfully, God designed cows to be milked every 12 hours. 12 hours is enough time for most of the cream to rise to the top of the milk container and in almost any weather the milk is still sweet after that long. Therefore, in general, you can have sweet milk to drink always on hand, if you milk your own cow.

What about the milk that becomes sour? You may give it to pigs or chickens, but the simplest cheese of all, named after the simple dwelling in which it can be made - cottage, is made from curdled milk. Sour milk, after it clabbers or curdles, is nutritionally similar to yoghurt and is enjoyed as that in many cultures. At room temperature milk curdles in 24-36 hours. Simply skim off the cream and heat the curdled milk until a little too hot to handle, stirring occasionally. As it heats, the curds shrink and the volume of whey, the liquid remainder, increases. When the curds have a rubbery texture, your cottage cheese is done. Pour everything through a colander or strainer, catching the whey in a container to use later to feed to your pigs and chickens. Once the curds are drained, squeeze out the remaining whey with your hands and add salt to taste. If desired, add back some of the sour cream you skimmed off the milk, to make creamed cottage cheese. Enjoy on tortillas or bread, in salads, or anywhere else cottage cheese is called for. The recipe below is from Eastern European culture, but can be prepared using cassava flour as described in issue 24 [Feb-April 2014].

SRINIKIS (Cottage Cheese Patties)

1 lb. dry (well pressed out) cottage cheese 2 or more eggs Salt to taste Enough flour to hold together

I never measure these ingredients. They can be more cheesy, eggy or doughy, according to taste and availability. Mix all together, shape into patties with moistened hands, and fry in hot fat till brown on both sides. A quick breakfast solution!

Cottage Cheese Blintzes: a More Elaborate Treat!

Blintzes (crepes, or thin pancakes)

1 tablespoon oil or melted butter 2 cups milk 2 cups flour 1 teaspoon salt 2 eggs

Batter should be the consistency of cream. Mix batter and pour into a pitcher. Heat frying pans and pour batter with one hand, while tilting pan to cover thinly with batter. Cook on only one side till set, then flip onto a plate. Continue till all batter is used up. Pans do not need to be greased if there is oil in the batter.

Filling

2 cups cottage cheese 2 eggs 1 tablespoon sugar Salt to taste

With blintzes fried side up, place a spoonful of filling in the middle. Fold over bottom edge then the two sides, then fold or roll over, envelope style. Fry the folded blintzes on both sides in butter. Eat as a salty dish, or as a sweet with fruit and syrup.

"Planting the seeds for a better tomorrow"...

Turmeric – A Tasty, Beautiful Plant with a Powerhouse of Healing Properties

By Mary Susan Loan

Turmeric is the root spice which is a main ingredient in curry and mustard. The plant is also a stunning, flowering, tropical delight in the garden. Turmeric has recently been 'rediscovered' as a plant with rhizomes

with many healing properties. It is easy to grow, especially in the tropics. The entire plant is edible, from the leaves, which are used as a wrap for grains and vegetables, to the exotic, decorative white flowers and especially the yellow-orange rhizomes, which are enjoyed world-wide in South Asian and Indian cuisine. Turmeric rhizomes may be grated or chopped raw in salads, rice dishes or in curries and coconut sauces, or may be used in ground powdered form after being boiled, dried and ground. The taste is described as a subtly pungent, peppery, zesty flavour with warm, slightly bitter undertones and a mild pleasant fragrance. In addition to its culinary, medicinal and landscape attraction, turmeric is used as an ingredient in perfume and as a yarn and clothing dye.

Turmeric, *Curumae longae*, also known as Indian saffron, yellow ginger or curcumin, is a rhizomatous, herbaceous perennial plant of the ginger family, *Zingiberaceae*. Turmeric use dates back to at least 300 B.C. It has been cultivated in China since at least the 7^{th} century and is considered to be native to south-east India.

Turmeric makes a decorative addition to gardens. The plant is easily started by planting the roots of the plant in moist loamy soil which receives morning sun and preferably afternoon filtered shade. Turmeric rhizomes may be found in the San Ignacio and other outdoor markets in Belize. They look similar to ginger, but form into several small light-brownish 'fingers'. Choose firm rhizomes; a few sprouts are helpful to get the planting started. If you cannot find turmeric in the market ask around or go on-line to a garden discussion group in Belize, such as 'Plants of Belize', a Facebook group. To plant, prepare the soil by digging down about three to four inches to loosen the soil. Plant the rhizomes about one to two inches deep, then keep the soil moist, but not soggy until the green shoot emerges. Then water to keep soil moist not damp. Organic fertilizer or 'compost tea' are beneficial for plant growth when applied every other month. Turmeric will grow to be approximately three feet tall with attractive broad green leaves and lovely decorative white flowers. It takes about seven to ten months to harvest. Turmeric can be planted year round in Belize; just be sure to water during the dry season. Once the leaves of the plant wilt, gently dig around the base of the plant to find the rhizomes. Wash and use raw or boil the rhizomes for about forty-five minutes, then cool, peel and sun-dry for about a week or place in a dehydrator until the rhizomes are totally dry, then pulverize and store in a cool dry location. Please be advised that turmeric will stain your hands and clothing to be a lovely deep vellow color.

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Continued on Page 29

Tumeric...Continued from Page 28

Turmeric has been revered for centuries as an Ayurvedic medicine. Turmeric contains immune boosting polysaccharides and is rich in iron, vitamin C and manganese. Traditional medicinal uses include: treatment for liver

ailments. ulcers. parasitic infections, heart disease, skin diseases, a home remedy for sunburn, joint pain and inflammation, for the treatment of cold and flu symptoms, as an antiseptic and antibacterial aid,

to help provide protection against Alzheimers dementia, for prevention and treatment of some cancers, multiple sclerosis and as a general digestive aid. Turmeric is used by some to help alleviate anxiety and depression. Global Healing Center advises persons who take prescription medication for diabetes to avoid turmeric.

In the event you do not have time or space to grow turmeric in your home garden, look for bright yellowish orange plastic packets of 'Yellow Ginger' in the spice section of the supermarket. Tumeric adds a rich golden color to rice, pancakes, baked goods, casseroles, soups, and as an ingredient in 'smoothies' to pair well with pineapple, banana, orange, mango, papaya.

NEW LIFE FARM

A RESTRICTED*, ORGANIC, AGRICULTURAL COMMUNITY

In Duck Run 2, Cayo, adjacent to Spanish Lookout FEATURING:

deborahpenner@hotmail.ca

*subject to approval, rules and regulations

TURING: wide, 14

 1-5 Acre Home-Sites
 night th

Raising Chickens - Naturally at New Life Farm By Dottie Feucht

A colorful array of chickens roaming around a 15 acre field greeted us at New Life Farm when we visited there to see their portable chicken coops. We happened to

arrive during the hour in the morning that the chickens are let out of their coops to supplement the grass available to them as the floor of their coops. They are also let out for an hour in late afternoon. When it's time to go back into their coops, Abel Garcia, who manages the operation, says he heads for a coop and all the chickens that belong in that coop run after him. Their in-coop organic diet, consisting of rain water and ground white corn, local grasses, various beans, rice, amaranth, and milo grown on the farm, mineral supplements, and weeds pulled from their gardens, was developed by Dr. Keller and

his workers, Abel and Antonio Orsini.

Having lost many chickens to an ocelot at the beginning of their enterprise, the New Life Farm crew decided to build very sturdy 14' by 14' sapodilla wooden skids with

heavy-duty wire fencing attached to the frame of the open areas flanking the hen house. The skids have 2 hooks on either side for pulling them and are moved every other day to allow the chickens to have fresh grass and a clean floor. While in their 4' wide, 14' long, 6 ' high hen house, also made of sapodilla wood, they lay their eggs in straw-lined bins that line one side. Usual egg production is approximately 1 egg per day, per chicken. At night the chickens roost on bars across the width of half the structure. The 14' by 5' fenced areas are covered with palm fronds as needed for shade. Two guineas, which live in pairs, were added to each brood, for their sentinel function of making a lot of noise when unusual creatures/movement occurs.

One of the coops has a 2' by 4' fenced "crib" where the young chickens, hatched by brood hens used only for that purpose, spend their first month eating ground up organic feed and growing new feathers. Fresh eggs are put under the brood hens daily. After a month in the hatchery the young chickens are housed for 2 - 3 months in another coop to determine their sex and final destination: with layer birds or broilers. Broilers are not as free-ranging as the layers; Dr. Keller says that most of the broilers weight over 7 pounds in less than 12 months. The recent addition of turkeys will boost the meat production.

To date the organic eggs are sold to other families living at New Life Farm.

Note: Since our visit Dr. Keller informs us that due to a hawk taking one of the young hens and sighting many other hawks and a puma nearby they have stopped free-ranging their poultry except the short time they let them out every other day when the coops are moved and cleaned.

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Pound Solids System...Continued from page 6

Table 1. Examples of pound solids per box of Valencia orange.

Entry	Brix	Acid	Ratio	Juice/ Box	Solids/ Box	\$/PS	\$/Box
1	10.9999	0.4997	22.0131	52.94	5.8234	\$1.50	\$8.74
2	10.9999	0.7494	14.6790	55.67	6.1236	\$1.50	\$9.18

In the example shown in Table 1 both growers delivered fruit with the same brix value; however in the first case the fruit had a 22.0131 ratio and had 52.94% weight of juice for the fruit. The pound solids per box is 5.8234. In the second case the ratio of the fruit was 14.6790 and the percentage of juice per box was 55.67% and the pound solids was 6.1236. The first grower will receive \$8.74 per box while the second grower will receive \$9.18 per box. This is payment for quality of juice, the pound solids system of payment.

The Pound Solids Lab Authority that oversees the two pound solids labs, one at each factory, is not controlled by the factories or by the growers. In the United States, the USDA is the independent body that oversees the functioning of the pound solids labs in the US. In Belize, as there is no government agency that undertakes the oversight of the pound solids labs; it is done by a committee made up of two representatives from the factories and two representatives from the Citrus Growers Associations to represent the growers. A chairman who is independent for both the factories and the growers oversees the manager who is responsible for the day-to-day operations of the pound solids labs including ensuring that the labs conform to strict quality protocols which, in turn, ensure the validity of the tests performed.

Drought Relief...Continued from Page 14

"It Pays to Get it Right!

A Roe Group Company

There is an old saying in many areas where dry weather is a factor in crop production: "Potassium is the poor man's irrigation." Put another way, if you don't tend to have enough water or the money to buy it, be sure the soil has a good potassium content. Like calcium, potassium availability depends not just on how many available pounds per acre are in the soil, but even more important is, What percentage of the soil's nutrient holding capacity is comprised of potassium? If the soil has less than 2% potassium, applying enough to reach and remain above 2% in the soil will be most helpful. Potassium is needed to build strong cell walls to keep the plants more erect and provide better water uptake. When the soil is short of potassium it requires more water to grow the same tonnage and until there is adequate potassium, adding more zinc does not necessarily solve the problem.

Yet when considering what is required to maximize water use, be sure that zinc is adequately supplied once the other elements are there in sufficient amounts. Just keep in mind, the lower the humus is in the soil and the lower the zinc level is below 6 ppm, the more the water that comes to be available for crop use will be lost.

If your corn for grain, forages or any other cropping program is not performing as well as it seems should be the case, you may want to consider the possible use of our detailed soil analysis and fertility recommendations on a small portion of your acreage to compare results.

ASK RUBBER BOOTS

Reply to Ask Rubber **Boots** question:

When to Plant Seeds

In response to the question "when should I plant seeds for various vegetables?" sent to Rubber Boots,

Dottie Feucht compiled this chart summarizing the data collected from over 35 farmers. The months with the highest numbers are the months best suited for planting seeds for the crop identified in the first column. The comment for green beans, cucumbers, eggplant, mustard

greens, sweet potatoes, okra, peppers, pumpkin, radishes, spinach, squash, tomatoes and watermelons is that you can plant them any month. Consult issues 13 and 23 to find out how the phase of the moon affects planting. Most farmers save their seeds from year to year and plant some crops twice a year. Mayan beans are planted by some farmers for adding nitrogen back into the soil and do not eat the beans. Others harvest the beans for food. See issue 15 for the discussion about Mayan beans.

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

Vegetable, Herb, Melon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Basil	ç								2	2	ſ	
Beans, Mayan	>								0	4		-
Beans, fava, lima										1	-	-
Beans, green	26	1	1	2		2				1	2	1
Beets	3										1	1
Broccoli	4										1	1
Cabbage, green		1		3	3	23	1		2	3	5	22
Cabbage, red	2					8	1			1	1	8
Cantalopes	1		1			5	20	1			4	18
Carrots										17	14	1
Cauliflower	3							1		1	2	1
Celery	2							1	1	1		
Corn, sweet		1			0	15	3	1			1	
Cucumbers	25	1			1	8	2	2				1
Eggplant, auberguine	4										1	1
Eggplant, Italian											1	1
Garlic										1	2	
Kohlrabi										1	1	1
Leeks										1	2	1
Lettuce, iceberg	1				1	16	2	1				
Lettuce, leaf, romaine	1				1	19	3	1		1	1	1
Mustard greens						4						
Okra	6					15						
Onions, green						0				2	0	Ч
Onions, red, white, yellow									1	3	3	
Parsley								1	1	1	1	Ч
Peas, snow											1	1
Peanuts						10						1
Peppers, habanero, jalapeno	21	1			0	1	1				1	1
Peppers, sweet		1	7	21	ß	1	1	1	1	1	0	
Potatoes, sweet	3				5	2			2	1	1	-
Potatoes, white	1									1	0	
Potatoes, yams	5				2	2						
Pumpkin	13		1			1				1		
Radishes, red	13					1				1	1	1
Radishes, white												
Spinach	3											
Squash, acorn, zucchini	20	1	1	1		1				1	1	Ч
Squash, summer (yellow)					1	1	1			1	1	Ч
Tomatoes					З	19	1	9	2			
Watermelons			Ч	-	0	20		1		3		Ч

FEB. 2015 BelizeAgReport.com 31

The Belize Livestock Producers Association (BLPA) will hold its annual AGM at their headquarters at Mile 47 1/2, George Price Highway, on Saturday, February 28th. Registration will begin at 9 A.M. and the meeting will commence at 10 A.M. sharp.

World renowned soil fertility expert Neal Kinsey will travel to Belize to present a 3 day workshop at University of Belize, Central Farm on May 11, 12 & 13, 2015. University students will attend and there are a limited number 🗾 of seats open to the public. See pg 15 for details.

NATIONAL AGRICULTURE AND TRADE SHOW (NATS) MAY 1 - 3, 2015, Belmopan

SPANISH LOOKOUT 2014 CROP DATA 22,563 acs

Acres corn planted Summer Acres corn planted Winter Acres milo planted Winter Acres R.K. beans planted Acres B.E. peas planted Acres soy beans planted Acres rice planted Acres other crops planted Bags corn harvested Summer Bags white corn harvested Bags milo harvested winter Bags R. K. beans harvested Bags B. E. peas harvested Bags soy Bags rice, milled Bags other crops

1,239,927 (100 lb bags)

For Information on the status of the Iguana Creek Bridge

3,470

3,653

4,977

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

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

0	Local an Fuel	d Regiona Prices	l
	Cayo, Belize	Quintana Roo, Mexico	Peten, Guatemala
REGULAR	↓ \$7.50 Bz/Gal	↓ \$5.58 Bz/Gal	¥ \$6.09 Bz/Gal
PREMIUM	↓ \$7.98 Bz/Gal	↓ \$6.04 Bz/Gal	↓ \$6.96 Bz/Gal
DIESEL	↓ \$7.31 Bz/Gal	🕈 \$8.27 Bz/Gal	↓ \$5.80 Bz/Gal

CITRUS: The USDA estimates that in 2015 global orange production is likely to rise 2%, grapefruit production is expected to increase 5%, and lemon/lime production is expected to decline 5%. The USA's

orange production is predicted to decrease 16%. Growth in Brazil and China account for the world increase.

FAO Regional Director Raúl Benítez complimented **Central America for being** the world region with the most nations who met their

hunger target of the first of the eight Millennium Development Goals (MDG)and also warned the region of perilous soil degradation. Benítez' messages included:

*Central America and southern Mexico have the worst soil degradation, at 26% of land affected. South America's figure is 14%.

*Up to 33% of the world's land is degraded either physically, chemically or biologically.

*Keeping the soil healthy makes food production possible.

*It can take 1,000 years to generate one centimeter of healthy soil, but we can lose that centimeter in a few seconds.

*Latin America and the Caribbean have the largest amount of potential arable land in the world.

*4 countries account for more than 40% of the degraded land in the region – and this is in regions with high poverty rates.

*Sustainable soil is a silent ally in the eradication of hunger.

The State of Food Insecurity in the World 2014 Report indicates that people in this region suffering from hunger fell from 15.3% in 1990-92 to 6.1% in 2012-14.

SPANISH LOOKOUT RESCUE TEAM 6000-911 & 6770-911

It has been our pleasure providing medical transportation since 1999.

Spanish Lookout Rescue Team, a non-profit organization, consists of 2 Ambulances and 1 Rescue truck. The ambulances are fully equipped with lifesaving supplies and 3 Emergency Medical Technicians. The rescue truck has the Jaws of Life (hydraulic scissors) and other tools to open vehicles if people have been trapped.

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

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

Life is a Treasure, We CARE!

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

AG BRIEFS

As the photo shows, no machete needed to enjoy this coconut, rolled out at the end of 2014 by Cocanmex, a Canadian Mexican company. It comes ready for drinking with its inserted drinking spout and a key to afterwards open it up to enjoy

the flesh. It differs from most supermarket coconut waters in that it is not pasteurized and has a 30 day shelf life but needs refrigeration. Currently it is only available within Mexico but the company has export intentions.

A UC Berkeley study released in December 2014 stated "The yields of organic farms, especially those growing multiple crops, compare

well with those of chemically intensive agriculture." According to senior author Professor Claire Kremen "With global food needs predicted to greatly increase in the next 50 years, it's critical to look more closely at organic farming, because aside from the environmental impacts of industrial agriculture, the ability of synthetic fertilizers to increase crop yields has been declining." After examining 115 studies comparing organic and conventional agriculture, the organic yields were found to be 19.2% lower than conventional. Researchers believe that this difference is actually smaller due to the bias in many studies. The authors opine that two practices, multicropping and crop rotation could reduce this gap to 9%. Notably, there were no real gaps for yields for legumes - such as beans, peas and lentils. Lead author Lauren Ponisio added that agroecological management techniques and breeding cultivars for organic systems could reduce or eliminate the yield gap. "This is especially true if we mimic nature by creating ecologically diverse farms that harness important ecological interactions like the nitrogen-fixing benefits of intercropping or cover-cropping with legumes." Kremer summarized, "Our current agricultural system produces far more food than is needed to provide for everyone on the planet. Eradicating world hunger requires increasing the access to food, not simply the production. Also, increasing the proportion of agriculture that uses sustainable organic methods of farming is not a choice, it's a necessity."

Dow's Enlist Corn & Soybeans was approved in September 2014 by the USDA; Dow Enlist Duo Herbicide was approved in late October by the US EPA,

but faces a challenge in court. Enlist Duo is a combination of 2,4-D and glyphosate. There is some concern that the new combination herbicide will create more resistant weeds and many worry about food safety from the resultant crops. 2,4-D was a component of Agent Orange and has been linked to both Parkinson's disease and non-hodgkin's lymphoma. The USDA estimates that with the Enlist crops allowed, that annual 2,4-D use on crops would rise to between 77.8 to 176.2 million pounds per year in the USA, by 2020. In 2011, USA use of 2,4-D was about 25.6 million pounds. Dow Chairman and CEO Andrew Liveris projects Enlist Duo will double Dow Agroscience's profits in 5 to 7 yrs.

RICE: In 2014 Guyana increased their rice production by over 15% to 600,000 tonnes. Rice exports went up 23%, creating challenges for both marketing and storage. New Asian producers have also affected world rice prices, deteriorating

Guyana's premium market position. Guyana government reacted with increased investments for storage and by encouraging value-added development for rice. Rice use has since increased in animal feeds, sometimes replacing corn – which has at least temporarily affected Belize's corn exports. *Newsite Caribbean 360* reports, "the Guyana Ministry of Agriculture has managed to attract markets in Haiti, Panama **and Belize**, and is looking to capture markets in Guatemala and several African countries."

FUEL PRICES: An unusual situation occurred in late 2014 when retail fuel was over \$1.BzD cheaper in Belize than in Quintana Roo, Mexico.

WANTED: Pin Grinder for cacao NAME: Linn Goss ~ TEL: 523-3544 E-MAIL: linnbluecrabbeach@gmail.com

Continued on Page 34

MACAL RIVERFRONT HOMESITES Road Frontage, River Frontage, Power On-Site

Minutes from San Ignacio Town

GATED RIVERFRONT COMMUNITY Gated Access, Macal Riverfront, Utilities 5 Minutes from Town, Common Area, Security

REL

743

Ag Briefs...Continued from Page 33

Israel's EdenShield has developed a unique nontoxic pesticide, which works by producing an odor which masks the crop's odor, thereby lowering the insect's attraction to the crop. Greenhouse trials have been 90% effective against thrips, whiteflies, red spider mites, and Tuta absoluta. Not only can this reduce the direct insect damage, it also reduces diseases transmitted by the pests. Their product NET is first applied

to the greenhouse screens, then its second product, DIRECT, is applied to the plants themselves. The active ingredients are based on extracts of local medicinal plants. EdenShield says that these products maintain a longer efficacy, throughout the entire growing season of the crop, which is more than conventional chemical pesticides to which insects can develop resistance during a single growing season.

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The US EPA has begun the standard registration review for glyphosate (Roundup). The US has on several occasions raised the allowable limits

for residues in food. In 2013 levels for residues in oilseeds, including soy were raised to 15 times their previous level, and the levels for sweet potatoes and carrots was raised to 25 times the previous levels. No independent tests were conducted to justify these as government relied on data provided by manufacturers. In 2013 MIT researchers found that glyphosate residue in food and water induces disease by disrupting normal cellular detoxifying functions. They claimed that glyphosate exposure eventually can lead to increased risks for gastrointestinal disorders, obesity, diabetes, heart disease, depression, autism, infertility, cancer and Alzheimer's disease. Glyphosate is Belize's # 1 imported pesticide. It has been banned already in El Salvador and continues to be strongly associated with Chronic Kidney Disease (CKD) in Central America's sugarcane growing regions.

BELMOPAN 2014 RAIN

Courtesy of Don Thompson of Sibun Watershed Association donbzwxnews.blogspot.com

2014	Comments	mm	inch	Year
Jan	Slightly Above Normal	198.0	7.8	7.8
Feb	Below Normal	61.5	2.4	10.2
Mar	Much Below Normal	22.5	0.9	11.1
Apr	No Rain, Extreme Dry	0.0	0.0	11.1
May	Slightly Below Normal	147.0	5.8	16.9
Jun	Much Below Normal	125.0	4.9	21.8
Jul	Slightly Below Normal	263.0	10.4	32.2
Aug	Well Below Normal	125.0	4.9	37.1
Sep	Above Normal	352.3	13.9	51.0
Oct	Normal	262.7	10.3	61.3
Nov	Below Normal	82.0	3.2	64.5
Dec	Below Normal	117.0	4.6	69.1
Total	Driest since 2004	1756.0	69.1	69.1

Buried Treasure! New antibiotic discovery in Boston, Massachusetts: Northeastern University researchers, using novel methods, managed to harvest new antibacterial microbes from specially designed pods buried in one of the researcher's back yard. This discovery

has been described as a great breakthrough, and 'the tip of the iceberg'. Researchers anticipate more finds in the soil utilizing the new methods. The last clinically applied antibiotic discovery was in 1987. A further bonus is that they believe bacteria will have a hard time developing resistance to **teixobactin**, as the new antibiotic is named. Teixobactin is effective only for Grampositive bacteria, which includes MRSA and tuberculosis. The new drug cannot destroy Gram-negative bacteria such as E. coli. An enormous diversity of microbial biomass with medicinal potentials remains undiscovered and provides us with reason to value and protect our soil. Meanwhile, antibiotic use continues to rise worldwide and resistance continues to accelerate.

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