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MNRA Horticulture Center Vegetable Research and Demonstration By Teresita Balan

The Horticulture Demonstration Training and Center was established by the Republic of China – Taiwan Technical Mission in the late 90's and then transferred the Ministry to Agriculture of in 2012. The



horticulture program is now a part of the Crop Research and Development Unit at the Research, Development and Innovation Center in Central Farm, Cayo District. The program is primarily involved in the evaluation, demonstration and training of open field vegetable and exotic fruit tree production. The Ministry of Agriculture annual work plan is developed in accordance with the National Agriculture and Food Policy of Belize - 2015 to 2030 which has as the main objective "to provide an environment that is conducive to increasing production and productivity, promoting investment, and encouraging private sector involvement in agribusiness enterprises in a manner that ensures competitiveness, quality production, trade and sustainability".



overall The objective of the horticulture program is to fulfill the ministry goals which promoting are sustainable а agriculture to improve food nutrition and increase food security for

all Belizeans. The horticulture program offers to the general public capacity building and knowledge transfer in horticulture production, demonstrates the use of innovative technologies, establishes production systems using adequate farming techniques and carries out good agriculture practices to produce safe and quality fruits and vegetables. Some of our basic techniques include:

- \checkmark Crop rotation
- \checkmark Mixed cropping system: production of local and oriental vegetables, grains, legumes and fruit trees
- \checkmark Soil enrichment: production of bokashi, liquid fertilizer and compost
- \checkmark Weed control: manual and mechanical and the use of synthetic mulch
- ✓ Cover crop production: cannavalia and sunhemp
- \checkmark Seed collection (oriental vegetables)

Currently, the horticulture program is in the process of establishing two tomato research trials in which varieties and pesticide efficacy will be evaluated. Seed companies such as Marketing Arm International-Guatemala and the seed agent have established a collaborative relationship with the Crop Research and Development Unit to support technical officers in researchrelated activities.

The work of the horticulture program is often conducted with technical support from our partners in development such as Belize Agricultural Health Authority (BAHA), Caribbean Agricultural Research and Development Institute (CARDI), Pesticides Control Board (PCB)& University of Belize (UB). All public and private sectors, governmental institutions, farmers and other agriculture agencies interested in horticulture production are encouraged to visit us at Central Farm. It is open every day for visits. Individuals

may come without contacting us first but groups should contact central administration and request a tour at telephone 804-2129 to inform technicians of time the and specific interests such as the fruit tree nurserv.



aquaculture, agro processing, cover structure etc. Many of our products are for sale; central administration has a price list.

For further information on the type of services offered, you can reach the main office at telephone 804-4948 or visit our Facebook page, Agriculture Research Unit – Belize, to get an update on current projects and other ongoing activities.



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

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PRESS RELEASE

18 February 2016

On behalf of the rice industry in Belize, Circle R Products wishes to thank the Government of Belize, particularly the Ministry of Agriculture and the Bureau of Standards, for the strong and patriotic support it has provided and continues to provide to local producers. We acknowledge the support of the Belize Chamber of Commerce and Industry, the People's United Party, and the many other persons who have expressed their strong support for local producers against unwarranted attacks.

Circle R is a proud Belizean-owned company located in Blue Creek Community in the beautiful Orange Walk District. For 20 years Circle R has gone the extra mile to provide its customers with excellent products and services. We believe the actions of today greatly affect the outcome of the future. Circle R supports fair business competition based on equal opportunity, and we believe that reinforcing food security is an important consideration for the long-term future of Belize.

Belize is a jewel, a haven for agriculture. Circle R continuously strives to promote agriculture because we believe that the agroproductive sector is a significant contributor to Belize's economy, and it is our goal to provide Belizeans with competitively priced locally grown produce. However, Belize is small, so an international market is necessary to develop economies of scale which provide the benefit of reduced costs of production due to increased levels of production. Economies of scale are a necessity for Belize to produce food grains that are competitive on the world market, and, at the same time, provide Belizeans with food security and fair prices on food grains. With the support of the government, the private sector and the public, Belize has the potential to achieve economies of scale and become a major exporter of food grains.

Circle R processes rice grown in Belize and supplies Belizean consumers with a range of quality products to choose from: *Ruby Rice, Jade Rice* and *Premium Rice For Kids*. Circle R (d.b.a Belize Food Supply) ensures all products are grown, processed, and packaged safely.

A claim was recently released to media stating that local rice is contaminated with aflatoxins thereby posing a threat to human health. The claimant reportedly sent three samples of local rice to EUROFINS Lab in the USA to test for this mycotoxin. According to the lab results presented by the claimant, the grains contained "less than 2 micrograms per kilogram" of aflatoxins. If the samples of rice sent by the claimant were indeed samples of locally-produced rice, we are pleased to note that EUROFINS Lab has described the results of these tests on our Belizean produced rice as "excellent".

We appreciate the confidence that Belizean consumers have placed in Circle R to uphold high standards of quality and safety with our products. We assure all consumers that Circle R Products will remain faithful to our guiding philosophy: Whether you're running a farm, a business, or a family, Circle R Products stands on the foundational promise—**Done Right**.

TO THE EDITOR

Dear Editor,

My understanding of the recent evolution or revolution in agriculture in terms of crop selection and production methods is that since the beginning of the 20th century they have become almost entirely dependent on the use of nonsustainable methods and materials while nutritional quality has decreased. Generally, significant changes began occurring with the introduction of mechanized farm machinery and the wide spread use of synthetic fertilizers, especially nitrogen, during the first green revolution. The next readily recognizable phase included the introduction of a vast array of synthetic compounds designed to control animal, plant and microbial pests or conversely to alter the physiology of crops to suit marketing and consumer demands. Moving ahead to the present decade, the most significant change in agriculture is the widespread use of genetically engineered or modified organisms. These include species that are consumed directly by humans and their domestic animals as well as non-edible species that provide construction materials or that somehow benefit the growth of consumable species as in alley cropping. The major driving force behind these changes in agricultural production methods has been the need to feed the similarly unsustainable increase in human population that co-occurred during this same time period.

Unfortunately overall agricultural production continues to increasingly depend on unsustainable inputs of chemicals and fossil fuels while also converting more native plant and animal communities into farm land. In the race to feed a hungry planet, inadequate scientific studies were conducted which could have warned us that the ubiquitous presence of GMOs in the human diet may turn out to be a slow poison for the ever-expanding human population they were designed to feed.

Given the current scientific understanding of the declining health of the biosphere, certainly due to more human activities than just harmful agricultural practices, it makes perfect sense to begin a worldwide shift to sustainable organic based agricultural production systems with more reliance on locally adapted and grown species. A continued and growing addiction to agrochemicals and the planting of existing GMOs will undoubtedly be disastrous to millions of people and probably have irreversible negative impacts on global diversity and the known and unknown essential ecosystem services they provide, such as clean air and water. However, until all the political dust clears over solving world population growth or conversely there is a horrendous inevitable Malthusian die-off of an unprecedented number of people, organic agricultural practices will continue to be the exception rather than the norm. Of course, during the unknown length of this transition period it behooves the organic farming community to be further developed and fine-tuned to local conditions. Therefore, the bottom line in my opinion is that at some point in the future some form of organic agriculture will be the norm and not the exception.

Dr. Stephen Zitzer Calla Creek, Cayo District

TO THE EDITOR

Dear Editor,

A recent incident at the San Ignacio market underscores the urgent need to monitor pesticide residue in vegetables offered for sale to the general public. On that particular day, some beautiful sweet peppers were on sale. However, they had a film of powdery material on them. A customer asked if the powdery material was poisonous. The farmer answered that it was not. But another client interjected – "It is not poisonous?" The farmer then answered, "Yes but just a little bit; kills but real slow."

While the above may seem trivial matter, there is an urgent need to implement measures to ensure wholesome and safe food products on the domestic market by the relevant authorities. Should we not expect better? Is it too much to ask or expect?

Signed,

Felix Tzul.

On Thu, Dec 10, 2015 at 12:50 PM, NATASHA DUKE <<u>wordpress@agreport.bz</u>> wrote: From: NATASHA DUKE <<u>nduketobago@gmail.com</u>> Subject: TRADING CORN & PEAS WITH BELIZE

Message Body: Dear Sir / Madam,

I am Natasha Duke of Trinidad & Tobago and am interested in purchasing large quantities of corn and peas from Belize.

What is the process that I must undergo? Is there a database of corn and peas farmers that I can access?

I appreciate all of the assistance that I can get in this regard.

Sincerely,

Natasha Duke

On Tue, Jan 5, 2016 at 3:01 PM, joseph kelley<<u>joek@unitedag.</u> <u>net</u>> wrote:

Beth,

Good afternoon. My name is Joe Kelley; I am with United Agricultural Cooperative, Inc. (a.k.a. United Ag). We are a grain and cotton cooperative located along the Texas Gulf Coast between Houston and Corpus Christi, TX. Our major crops are grain sorghum, yellow corn and cotton. Lesser crops include: soft red wheat and soybeans.

I am curious, does Belize import a sizable amount of U.S. Yellow Corn into the country? I noticed on the ag prices sheet that it showed U.S. yellow corn. Would you know of any importers or large end-users of U.S. yellow corn and/or grain sorghum? The reason I ask is that it would be interesting to see if there are any trade opportunities; especially, two way trade with Belize and United Ag.

I look forward to hearing your thoughts on the matter. Best regards,

Joe Kelley

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Green Bananas - A Neglected Food By Harold Vernon



Next time you visit the market put some green bananas in your basket. This amazing but neglected food is the cheapest and tastiest starch source around. Green bananas used to be commonly eaten in Belize: boiled, fried or part of stews. Green bananas contain as

many minerals, especially potassium and magnesium, vitamins and fibre as the ripe fruit. The current price is around 3lbs (8-10 fingers) for \$1.00, cheaper than plantains and potatoes and having more flavor. Much of this fruit is thrown away as rejects yet is available for only the cost of transportation.

Our culinary artists and home cooks should take a second look at this food apart from the "boil-up" where it is most commonly seen. I challenge the creative cooks on TV, the hotels and restaurants and the banana producers (who throw them away by the tons) to promote this food. The Jamaicans and Pilipinos have a thing or two to teach us. Here are some recipes for delicious dishes:

Green bananas boiled whole and smothered in butter, garlic and a dash or oregano

Green banana salad, instead of potatoes

Mashed green bananas seasoned with spices, reformed into balls and deep fried

Green banana porridge, sweetened or unsweetened

Announcement: Green Banana Recipe Contest

The most original and best-tasting recipes using green bananas will win a prize of \$50.00.

Deadline: April 15, 2016.

Winners of 1st and 2nd prizes will be announced in the next issue. Please send your recipes to the editor: belizeagreport@gmail.com

High Density Planting In Orange Groves For Belize By Luis Tzul

Plagued with the dreaded Huanglongbing (HLB) formerly known as Citrus Greening, we must venture into unconventional production methods to increase yields. High density planting has been the norm in many citrus producing countries including Brazil and the Unites States (Florida and Texas). High



density planting is the production of citrus with more trees per acre than the conventional number. In Belize, the conventional planting spacing is 15 feet in rows and 25 feet between rows which totals 116 trees per acre. Before venturing into high density planting, several important factors must be considered: the types of rootstocks and scions to be used, soil type, yield performance, nutritional demand of the rootstocks and spacing.



The dominant rootstocks used in Belize are Sour orange (C. aurantium) and Cleopatra Mandarin (C. reticulata) which are relatively large growth trees. The goal of high density planting is to increase returns with early and more sustainable production. The most important factor to consider before establishing a grove (high density) is the rootstock. Many growers want an economic return on their investment as soon as possible which requires them to use rootstocks that are fast growing, thereby producing at minimum during the first three years. Studies have shown that fast growing rootstocks reach peak production between 10-15 years (Usher 1999, 4). The nature of the Sour orange rootstock is its tolerance to calcitic soil and fungal conditions (Phytophtora) along with peak bearing around five to eight years with five to six bags per tree (580/696 bags/acre). Cleopatra Mandarin produces small fruits but the quality of the fruit is not compromised. In Belize's citrus belt (Stann Creek District), this rootstock starts bearing around three to four years.

Due to the fact that Sour orange and Cleopatra Mandmarin are large trees, increasing tree density per acre can be achieved by effectively managing the size of the tree through pruning/ hedging and topping. Most young trees usually need no pruning for the first few years in the grove except for removal of sprouts on the trunk. When the tree is three to four years old, depending on its growth, branches that are closely spaced or are crossed and entangled may be removed (Tucker et. al 1994, 3). This pruning should be light, just sufficient to establish desirable grove architecture without stimulating excessive vegetative growth. If a well synchronized pruning/hedging program is enacted into grove management, spacing of 12 feet in rows and 20 feet between rows can be used, resulting in 181 trees per acre and a yield of 905/1086 bags/acre (potential yield for Sour orange rootstock). In high density planting, light becomes a limiting factor. Especially for the above mentioned rootstocks, adjustments must be made in the height, row width and hedging angle to maximize sunlight through the tree canopy.

During grove layout, each tree is allotted a specific unit space to grow in; when this space is exceeded, crowding occurs which translates into inadequate light penetration and loss of foliage. Hedging prevents or alleviates crowding. A hedging program can involve a two year or three year program. Groves on a two year program are hedged in one middle one year and the other middle the next year. A three year program might consist of hedging one middle the first year, the other the second and topping in the third year (Tucker et al 1994, 5). Common topping heights are usually around 12 feet to 16 feet. Maintenance hedging between rows should begin as soon as trees begin to encroach on the middle row.

References

Usher, William 1999. *Citrus Rootstocks of the Belize Citrus Industry*.

Wheaton, T. A., D. P. H. Tucker, and R. P. Muraro. 1994. Citrus Tree Pruning Principles and Practices. University of Florida



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Trapping the Mischievous Palm Weevil to Prevent Red Ring Disease in Your Coconut Grove By Edward Flowers, General Manager, San Miguel Farm



In the last issue of the Belize Ag Report (issue # 29 pg 37) Forrest Tackitt wrote about Red Ring Disease in coconuts. The vector for this disease which affects coconut and African oil palms, with up to 80% mortality, is the palm weevil (Rynchophoruspalmarum). This large red snout beetle is native all the way from Mexico through South America and resides in some parts of the Caribbean as well. The nematode (*Bursaphelenchus cocophilus*) which is the direct cause of Red Ring Disease, is carried in the gut of this palm weevil. San Miguel learned a successful technique to trap this beetle vector from the staff of Mexico's Instituto Nacional de Investigaciones



Forestales, Agricolas y Pecuarias (INIFAP) in Chetumal, Quintana Roo, Mexico. INIFAP is the research arm of Mexico's Ministry of Agriculture (SAGARPA).

As shown in the pictures there are two types of traps. The larger is made from a 5 gallon bucket

with a cover; the smaller trap is made from a one liter plastic coke container. The traps can be easily assembled by farmers and homeowners who have palms to protect. They have proved to be an effective means to reduce the beetle population at San Miguel, and we have noted a significant decrease in Red Ring disease since its introduction. The pheromones are a substance which lures insects, along with the fruit, into the trap. The brand that San Miguel uses is Cocolur Fermona: Prieto del cocotero. A pheromone substance can be purchased from Mr. Jose Manuel Rodas of Blackman Eddy Village, Cayo District: 650-6719, 664-0695.

Materials for the big trap:

One 5 gallon bucket with holes cut in the cover the size of the plastic coke containers

4 liter size plastic coke bottles, cut off per picture

3 pineapple pieces, half inch slices, chopped

1 packet of pheromone (see below)

Tying wire for hanging



Materials for the smaller trap:

One liter plastic coke bottle with a hole cut into the upper side of it

Tying wire for hanging

¹/₂ of a ¹/₂ inch slice of pineapple, chopped and put inside

1 packet of pheromone put inside

Traps should be placed in all cardinal points (N,S,E,W). Determine the size of the field and place 1 trap per acre at each point. For example, a 12 acre plot should have 2 traps on each side placed on



have 3 traps on each side placed on the outskirts of the block.

Traps should be set out all year, although studies show that the highest adult population occurs in the dry season. Traps should be checked and emptied every 2 days, at which time the beetles should be killed individually.





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February 2016 AgReport.bz 8 Harvesting Ag News from All of Belize

Beekeeping in Belize Cayo Quality Honey Producers Cooperative By Montse Casademunt



The first beekeepers in Belize were the ancient Maya. They kept stingless bees, *Melipona beecheii*, in hives made from hollowed out logs. The entrance hole was made midway between the two ends and the ends were sealed with clay. Honey was harvested one to three times a year: in March, April and in a good year, in December as well. Large apiaries existed in Corozal, Orange Walk and Cayo and honey was one of the chief exports of the Maya state of Chactumal in northern Belize.

Beekeeping with stingless bees continued until the mid 20th century but today only a few hives remain and the population of wild stingless bees is threatened by development.

Beekeeping with *Apis melifera* began in the Corozal District in 1957 when Tony Espat and Hernan Urbina brought beekeepers from the Yucatan. Several colonies were established at Central Farm as well, but these soon died due to a lack of knowledge in beekeeping. By December 1958 there were 958 colonies in Corozal and Orange Walk Districts and fifteen drums of honey were exported that year.



Beekeeping became established in Belize and grew quickly. By 1959 there were 1,108 colonies in the Corozal and Orange Walk Districts, and colonies were reestablished at Central Farm. In the Cayo District, beekeeping was first started by Noel MacDougall as a hobby in the early seventies with no others taking notice or showing an interest in beekeeping. Then sometime in 1973 Francisco Gutierrez, an underwriter with an insurance company, read an article on ways of increasing one's income through parttime projects; listed among other things was beekeeping. He then began to inquire about and to seek information on beekeeping until he came in contact with Cecil Turton who was burning with the idea of beekeeping as a way of life but had no knowledge of the subject. His dream was to purchase a number of hives and sub-let to other people who would learn to take care of bees as a means of increasing their income; in 1973 he bought a large number of colonies and sub-let 12 to others.

After the first year of operation many more people were interested in the project, so the idea of a cooperative really became possible. In July 1974 Euri Beekeepers' Cooperative Society Limited was registered and began its operations. After a few successful years, a part of the membership decided to abandon Euri because of major differences in perspective and policy.



In 1980, the group of beekeepers that broke away got together and organized into another cooperative, Western Beekeepers Cooperative Society Limited. The society started with a total of 23 beekeepers drawn from all walks of life from all over the Cayo District and it operated successfully supplying the

> domestic market with quality honey. Together with Southern Beekeepers Cooperative they also exported unfiltered, unheated honey to the French and German markets.

> In 1998 the industry suffered two major setbacks. First, the widespread spraying of marihuana fields decimated the bee population, especially in the Cayo District, where the loss of bee colonies was massive and beekeepers suffered heavy losses. The second setback was the arrival of the Africanized bees spreading north from Brazil, which further weakened an industry already in trouble. Many beekeepers used to the gentle bees abandoned the activity. In a few years, a thriving industry with a potential to become one of Belize's main exports had almost disappeared. The lack of an adequate response to both crises was undoubtedly a major factor in its demise.

Continued on Page 13

BEYOND THE BACKYARD A Leaf From My Recipe Book By Jenny Wildman



Eating from the wild can create an unexpected culinary masterpiece or become a recipe for disaster. It is important to have sufficient information. Knowing something to be edible is not enough to prevent you from harm. Knowledge of content and preparation is essential. My daughter-in-law decorated our dinner plates with the wonderful heart shaped leaves of the taro plant commonly called elephant ears placed under some delicious stewed chicken. Whilst scooping up the juices my son popped the leaf in his mouth chewed it up and moments later was gasping for water and on the verge of a trip to the emergency room even though that would have meant thirty miles of rough roads at night. These plants have saponins that instantly inflame the mouth and throat causing chronic itching. He survived the experience and a lesson was learned.

Even though the usual part of the taro used is the rhizome or root, it, too, is toxic with calcium oxalate crystals and must be soaked and cooked. Taro root can actually lead to kidney stones and is best to consume with calcium rich foods as a balance. The coco yam and dasheen are the most common types of taro in Belize and can be found in most wet low lying land. Taro can thrive in flooded areas due to the air spaces in the petiole which act like drinking straws allowing exchange between the water and the outside atmosphere. It flourishes in flooded conditions but not in warm stagnant water which will induce rotting. Taro root is a food staple to ten percent of the world's population being a great source of vitamins A and C and minerals; yet the leaves actually contain more protein and health benefit. Some cultures embrace the leaves and cultivate exclusively for its foliage. It is also grown as an attractive ornamental plant. To me the



epitome of a lush tropical garden is that adorned hibiscus with flowers, bananas, coconuts, lots of taro and gingers, all abundant in delicious produce and the heady ylang scent of ylang.

Taro, Colocasia esculente, originated from South East Asia or South India and was carried by early seafaring travelers to many islands. Natural disasters probably caused the need to find new resources and settle elsewhere to ensure survival. Some travelers, fired by curiosity, were propelled to make remarkable journeys in canoes made from dug out trees sealed with coconut fiber and breadfruit sap, powered by sails and paddles and launched into the powerful Pacific Ocean. The travelers carried with them a cornucopia of plants and animals settling into new territory and becoming farmers rather than hunters and foragers of food. They found fertile land in Hawaii and began lives of domestication with respect for the environment. The earlier practices had made many animals and vegetation extinct and planting and nurturing was to be their best option. Taro was a very important crop and the settlers to Hawaii saw it as a sacred plant entwined in the story of creation. Haloa (taro) is named for the first born son of the couple who begat the human race. The Hawaiians loved and cared for the plant that would ensure their continuance. It became part of rituals conducted by the men folk who ground roots into ceremonial poi. Tradition has it that men cultivated and also prepared their family food. In early days more than 300 varieties were cultivated, some for wet lands and others for dry. Taro terraces were constructed, conditioned by mulched leaves and then flooded making new ground in which to plant.

The practice and reverence given to the taro plant continued on from 300 AD. Then in 2002 there came some trouble in paradise. The University of Hawaii who had been working on improving the crops patented three varieties causing fierce objection by the farmers who were required to pay for this stock.



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Then later genetic engineering of 3 varieties, inserting genes from stock of wheat, rice and grapevines, was done without permission of the people. Now outraged, the people fought to protect what was seen as their right. This battle continued for years before GMO was halted and patents dropped.

The early seafaring explorers, the Vikings and Polynesians, were responsible for introducing new vegetation wherever they landed. It is hard to truly identify the territorial origin of one plant. South America is credited with the emergence of potatoes and a multiple of root vegetables. Although taro is grown throughout the Americas, the potato became more popular. The use of taro leaves came from ancestral tradition and still today throughout Polynesia the versatile taro leaf is valued as a highly nutritious food. Best examples are from Samoans

who make a dish called Palusami. The leaves are made into а rosette then filled with coconut milk and onions, rolled into а ball. wrapped in banana then breadfruit leaves steamed and in an 11m11



creating a smokey, creamy, savory street food. You can do this in a steamer and cook for 50 minutes. Discard banana and breadfruit wrapper and cut into the delicious center.

Other country creations include:

The West Indies: Callaloo, taro leaves and stems boiled and creamed and served alongside a boil up root soup.

The Philippines: *Laing, t*aro leaves, coconut cream, red chilies, ginger, shrimp paste, pork and onions simmered for about an hour.

Vietnam: Canh Chur, soup.

Tonga: *Lupula*, corned beef wrapped in taro leaves. Lu is the name of the taro leaf. It is interesting how many islands in that vicinity use canned corned beef; I am thinking that the reason is during the war that is what was available.

West Africa: Leaf soup.

Nepal: *Maseura*, balls of flour and leaves. The people there say, "Our life is as venerable as water stuck in the leaf of the taro."

India: *Kosu Lati*, young leaf buds cooked with tamarind and beans; seafood is added.

Greece: many islanders credit taro as saving them from famine in World War11.

Senegal: Jaaber, a side dish of stewed leaves.

Bangladesh: stems cooked and eaten with prawns or fish, leaves and stems cooked with onions and coconut milk and eaten with meat or fish.

Pakistan: Pakora, leaves rolled in gram (chick pea flour).

Tumeric (vellow ginger), commonly used spice, is used with coconut milk and seafood in many recipes. Here's an easy recipe: dice onions and cook lightly in olive oil and butter, add chopped leaves



and stems and cook for 15 minutes, add tablespoon of tumeric, cover with coconut milk and cook for a further 10 minutes. Enjoy.

I am always on the lookout for tasty survival food and was pleasantly surprised to discover taro leaves which I would rank as a delicacy. My favorite is the Samoan *Palusami*. You can find preparation demonstrations for this on You Tube which has become a marvelous self-help tool.

So it can be seen that taro is much revered, its use being widespread even though it never made it to our tables. YET!

As always love to hear your comments and insights.

Jenny Wildman bayshorelimited@gmail.com **Pictures courtesy Xen Wildman**



Watershed Management: A Tool for Sustainable Development

By Tanya Santos

As the population of Belize continues to grow the demand for use of the naturalresources will continue to rise. Human beings are completely dependent on the environment for survival. The land produces the food we eat, the forests provide the water we drink and the shelter we need. It is an unending struggle to balance economic development with the protection of the environment, also known as sustainable development. In 1987 the World Commission on Environment and Development defined sustainable development as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It is not an end but rather a process for meeting human development goals while maintaining the ability of the earth's natural systems to provide in perpetuity, the natural resources and ecosystem services upon which the economy and society depend.

HOW WATERSHEDS WORK

With the many competing interests for finite resources at every level of society, it is no doubt a difficult task to plan for and work toward sustainable development. Nevertheless, there are options to support the process. One of these is watershed management and planning. What is a watershed? A watershed is a basin-like physical landscape, where water that is "shed" from the land flows from the highest points on the landscape (mountain/hill ridge lines) to the lowest points in the basin, usually a river, stream or lake. The water shed from the land eventually drains into the seas and oceans. The water within this basin landscape is from both surface and subsurface (groundwater), being sourced from snowmelt, and in the case of Belize, rainfall and storm water runoff (Figure 2). One watershed is separated from another by naturally elevated areas. Adjacent watersheds always share the ridgelines.

Water as a basic need for human survival is a valuable natural resource and therefore requires proper use and management. Management of environmental issues has in the past generally taken a silo approach in which specific issues are addressed individually and separately. It has traditionally been focused on specific concerns of land, air, water or wildlife, for example. But at the broader landscape level, in particular the watershed landscape, it is clear to see that the various land uses impact on users downstream. It is important to recognize that we all live in a watershed. What happens upstream of us will affect us, and our own everyday activities will affect downstream waters and users. The quality and quantity of water is affected by land use including roads, urban development, agriculture, mining and other activities of people in a watershed. But these activities may be necessary for our development and well being. So how do we achieve the balance in maintaining an acceptable quality of water with these necessary human activities? One answer is watershed management.

s e e k s to balance healthy ecological, economic, and cultural/ conditions within a

Watershed watershed. management serves to integrate planning for land and water; it takes into account both ground and surface water flow, recognizing and planning for the interaction of water, plants, animals and human land use found within the physical boundaries of a watershed. With this approach we can address multiple issues and objectives, thus enabling planning within a very complex and uncertain environment. With the threats and risks of a changing climate, and multiple factors such as rising deforestation due to increased urbanization, large scale agricultural development and growth, invasive species etc., the need to balance the water needs of businesses and citizens, while at the same time maintaining the required amounts to meet ecological needs of our environment, becomes ever more pressing.

social

In Belize there are 18 major watersheds, with another 16 subwatersheds which drain the Maya Mountains and discharge into the Caribbean Sea (hydromet.gov.bz) (Figure 1, map on cover). The largest and most populated watershed is the Belize River Watershed, a portion of which is shared with Guatemala. We all live in a watershed. Can you identify the watershed where you are located? Think about how the activities upstream are affecting you. How are your activities affecting others downstream? Is there enough water to meet all the competing demands in your watershed – humans, agriculture, tourism, community expansion, ecosystems? What do you think is the quality of the water in your watershed?

Perhaps it's time to take a closer look at what's happening in your watershed. Watershed planning is not a new concept. However, in order to adequately address the economic, social and environmental issues of the nation, there needs to be a deliberate move toward holistic planning and evaluating at the watershed level which is inclusive and broad and combines the needs of diverse watershed stakeholders; a clear recognition of the balance between ecosystem, community and economic health; and a process which respects the integration of activities on the land and their impact on water. Several countries in the region have taken a holistic approach to planning, providing us with ample

Continued on Page 34

Watershed management is an adaptive, comprehensive, integrated multi-resource management planning process that

Map on cover created by Dwight Neal using data from Jan Meerman (BERDS).

Soils of Belize - The Southern Cayo and Stann Creek Districts By Harold Vernon

My last article left us on the limestone foothills of the Cayo District with its lower alluvial areas created by the Belize River.

The southern flank of the George Price Highway is a karst (limestone based) landscape with many limestone hills starting to give way to granitic hills and mountains further south. Further east, to the coast, we begin to see deposits of granitic sand and the first occurrence of a true coastline with sandy beaches that extend down to the Placencia Peninsula.



The soils inland from the coast are a mixture of lowland pine ridge with the introduction of highly oxidized acidic soils containing iron and manganese. These soils are a mixture of oxisols (oxidized soils) on the flood plains and inceptisols (recent alluvium) near the river courses. An elevated flood plain occurs in the middle reaches of the Caves Branch/Sibun floodplain. These reasonably fertile soils have a few but not very expansive areas, due to admixture of limestone but eventually give way to red, highly oxidized soils. The area is currently used for citrus production, following trials with cacao, and proceeds south along the Hummingbird Highway on the way to Middlesex, the beginning of the Stann Creek Valley. Ancient limestone hills form the eastern rim of the valley and the soils on the east of these hills, running along the Coastal Highway, are mostly broken ridge and true lowland pineridge, with clay hardpans prevailing in some areas. These areas are subject to flooding as it is part of the watershed of the Sibun Hills with low elevation.

The soils of the Stann Creek Valley are undulating with some areas steeply carved from the rushing waters of the many rivers, creeks and streams coming out of the hills. Citrus now dominates after the destruction of the banana plantations in the earlier part of the last century. There have been recent trials of corn/red beans in lower Middlesex but the soils may need liming. The soils of northern Stann Creek, such as the Melinda flood plain, are a mixture of recent alluvial material mixed with old flood plain granitic sand and curves south on the way to the banana plantations. Some of these areas have high growth of broadleaf forest and coconuts but citrus predominates. Most of the rest is fairly infertile and the floodplain occurring south of Hopkins/Kendall/Sittee has been recently cut down for pasture. Due to the infertility of the area, there are mixed/poor results with pasture grasses and stocking rates are very high. A number of areas, especially in the Sittee area, used to produce citrus, pineapples and rice, an indication of soils that have acidic pH. The alluvial areas along the rivers, such as the South Stann Creek River, are currently being used to produce bananas. A few areas on the western side of the Southern Highway are heavily forested but these soils, although fine textured, have a fragile structure and are shallow in some places and deep in others.

The eastern side of Southern Highway consists of coastal beaches and lowland pineridge that is underlain by bleached granitic sand and a clay hardpan. Drainage is a problem in these areas and palmetto, calabash and pine trees are the native vegetation; however the shrimp farms have been able to exploit the area. The soils of these areas, called *ultisols* (very leached in the extreme), extend all the way past Independence into the Toledo District. The western side of the highway is now being opened up to pineapple production as the citrus disease takes a toll and alternative crops are needed. The most extreme soils also have wood tree plantations, mainly pine.

One irony of this area is that the poor soils are associated with the best water quality to be found in Belize and it also has good enough rainfall for replenishment.

Comments to: hmvernon@yahoo.com

Beekeeping ... Continued from Page 9

Many years later, in 2006, a group of beekeepers organized together into the Cayo Quality Honey Producers' Cooperative. The coop's vision is to become one of Belize's main industries, generating gainful employment for



our people, especially women and youth, and to contribute to Belize's foreign exchange earnings through the export of honey and other hive products. Its members are also committed to protect the forests through beekeeping, to protect honeybees, and to provide customers with a healthy product that is 100% pure and processed under strict sanitary conditions.

Bees play an essential role in ensuring food security worldwide, and Belize has the potential to produce quality honey, beeswax, pollen, and other bee products from our abundant and pristine natural resources. When this is widely understood, it is our hope that the beekeeping industry will receive the attention and the incentives that are necessary to reach its full potential.

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BEL-CAR Updates Changing Times Invite Changes to the Belize Commodity Market

After a less than normal corn harvest caused by the summer drought (see national loss estimates in *Ag Briefs*, pg 32, Bel-Car reports that corn inventories are still more than adequate for domestic needs, although leaving little export surplus. Several farmers then planned to plant during the fall, normally a beanplanting time. However, the overabundant fall rains prevented many from following through on that plan. Due to the long-lasting rains most had to revert to the normal beans winter cycle, as they have a shorter growing period than corn. Quite a bit of RK beans and BE (black eye) peas are in the fields now. Last year was a record bean crop, with high acreages and high yields. Belize exported twice the amount of beans in 2015 than in 2014. About 50 containers (50k lbs per) remain. It's a challenge to find new markets, as "price decreases faster than quality."

Our freight situation continues to be a pending fluid issue challenging grain marketing in Belize. The Belize City port is still under receivership by the Belize Bank, and feasibility studies have been done using the site Espat had proposed for a cruise ship terminal. It would be closer for Cayo farmers, yet that port is shallow. Commerce Bight (closer than Big Creek) has a natural deep channel. Beltraide has also discussed a bulk port for Belize. Many farmers are waiting for 'the dust to settle' regarding shipping.

"We are too big and we are too small" explains Bel-Car CEO Otto Friesen. In October of 2014, Bel-Car made 2 bulk shipments of corn to Trinidad. This sale of 300,000 tons to one buyer, equaled 5% of the entire Spanish Lookout/Cayo corn harvest. Looking at the big picture, this same buyer requires 700 tons for each of his batches of chickens, that is, every 8 weeks.

Some growers are looking at alternative markets for corn, other than for chicken and pig feed in the Caribbean. For example, by targeting the more lucrative snack-food industry buyers in Central America, higher quality corn might bring better prices plus avoid the pitfalls of oceanic shipping.

Seed trials to identify better high quality yellow cornmeal grade corn varieties has been ongoing in Spanish Lookout, and in a year or two, Bel-Car will have sound seed recommendations for Spanish Lookout farmers.





Waste Management in Belize By Wiley Forrest Tackitt

Our Mayan Mountains are a beautiful sight to behold, but if we are not careful we will have other mountains made out of waste material. Are you aware of the "mountains" of plastic



floating in the Gulf of Mexico? Last estimates compare it to the size of Texas (30 times the size of Belize), and there is one in the Pacific that is twice that size. I admit that I am terrible at recycling; I burn my garbage, and, yes, that sometimes includes plastic, but it is time for a change. If all of us in Belize concentrate on recycling only the easiest items, paper, plastic, glass and aluminium, we would help keep our country clean and have a tremendous effect on our planet at the same time.



I was clueless about recycling facilities in Belize until my last trip to Xunantunich; I almost ran off the road looking at that big Solid Waste sign along George Price Highway. Now, after my first transfer station

experience, and a meeting with Mr. Emmerson Garcia at the Waste Management Office, I am much better informed and wish to share this information, and encourage you into some much needed recycling and possibly a good house cleaning.

Belize solid waste management (project) facilities include five transfer stations located in Belize City, San Pedro, Caye Caulker, Barrel Boom and Cayo. Some are located at previous dump sites that you might already be familiar with and at the regional landfill at mile 25 George Price Hwy. The facilities are government owned, run by the Belize Solid Waste Management Authority and operated by PASA BZ. Ltd.

Solid waste is simply material that has been discarded, and is no longer useful to its original owner. Proper disposal of all waste is important for two reasons: (1) to prevent the possibility of disease that can be transmitted by insect vectors, pest and vermin, that collect on trash and (2) to prevent pollution of

ground water and other water sources. We are running out of good water fast; if we don't protect our water I am positive that our grand kids are going to be thirsty – to say nothing about growing crops.



The keys to the solid waste cycle are waste generation (we do that), separation (trash audit), collection, treatment and final disposal. The five transfer stations serve as a link between community and final waste disposal at the landfill. Their aim is to provide a safe, efficient and cost effective means to process and transfer solid waste. Trash audits to separate recyclable materials such as PET (plastic), HDPE (high density plastic), glass, aluminium, scrap metal, waste electronics (very important), and even old mattresses are performed at the stations. My very next mission will be to help with their hazardous waste stream, as this is a major problem. (We still have loads of outdated and restricted insecticides stockpiled in many a barn, with no proper method of disposal.)

The regional soil landfill is the country's only landfill,

encompassing 370 acres, and is the final disposal location for waste originating from transfer stations. This facility is on an isolated land tract where solid waste that is no longer recyclable is disposed in a manner to protect human health and the environment following the guidelines of Solid Waste Association of North America (SWANA), 1991. The engineering method for the disposal of municipal solid waste includes the spreading of sorted garbage



into layers, followed by heavy compaction and completed by adding soil layer to speed decomposition and help eliminate vector harbourage. In addition care is taken to monitor the area's surface and ground water sources, and venting of methane created by decomposition.

Now that waste disposal has made us safer from disease and pestilence, time to talk about helping to save the planet by recycling. Transfer of recyclables to their final destination is undertaken by Belize Recycling Company, which has been in business since 2005; the company uses a waste management





Magnesium, an Essential Nutrient for Better Soil Fertility By Neal Kinsey



There are some important foundational principles for understanding and utilizing magnesium to achieve excellent soil fertility. It is important to correctly use this nutrient in terms of soil fertility for the most positive effect on crops and the greatest benefit to the soil where those plants will be grown. The overall concept hearkens back to the definition in agronomy textbooks concerning what makes up an ideal soil. That ideal soil is described as 25% air, 25% water, 45% mineral and 5% organic matter.

Most soils fall short of the ideal in some way. Clay soils are generally too tight, and due to a lack of calcium (which can be true even on high pH soils), they contain inadequate pore space resulting in too much water and not enough air for the ideal soil environment. Such soils tend to stay wet longer and become harder to work as they dry out. Sandy soils tend to have the opposite problem – too much air and not enough water – but they will still pack down and become hard when worked too wet, especially so when magnesium levels are excessive.

What if a farm is such that it falls into one of the above categories? What if you don't have that ideal soil? What has to be done to achieve it? Note, the question here is not just one of how do we supply needed magnesium for the next crop, but what can we do to achieve the ideal soil? Unless the approach of systematically building soil fertility developed by the late Dr. William Albrecht (a soil scientist of both microbiology and agronomy, and in that specific order over the span of his career at University of Missouri) is utilized, I know of no program that proposes it can be done at all. And the simple answer he would give is to correct the soil chemistry, which will build as closely as possible the correct physical structure (25% air, 25% water, 45% mineral and 5% humus) which in turn supplies the proper environment for the soil biology (roots, worms, microbes, etc.). Once accomplished, this provides the nutrients required to grow the most vigorous and nutritious plants.

For a large majority of the soils in the world, whether or not they are being used to grow plants and crops, specifically achieving the correct percentages of calcium and magnesium provides the basic requirements for this equation. For medium to heavy soils the numbers are 68% calcium and 12% magnesium, or as close as is feasible to achieve that. (For example 66 - 70% calcium and 10-12% magnesium should provide extremely satisfactory results.) In such soils emphasis is placed on

pushing the percentage of calcium toward the 70% mark and supplying enough magnesium to keep it above 10%, but below 12% for best overall results.

Caution: Soil test numbers for calcium saturation can be **extremely** variable and should not be assumed to mean the same based on tests done by another soil laboratory. Some labs show 75% calcium when our test numbers show 70%, others show 65% when ours is 70%. Not to say those numbers have been incorrectly determined, but that soils we would say are ideal from our testing would not necessarily appear to be the ideal when accepting the calcium number as meaning the same thing if analyzed by another laboratory.

When the presence of available soil calcium is correctly measured, soils that are most lacking, as reflected by lower and lower calcium percentages, are the hardest to work. As the calcium need is determined and correctly increased to achieve the required percentage, the soil actually becomes more friable. Such soils are easier to work up, have better water penetration and possess a better relationship of air to water due to the effects of better soil porosity. This happens because calcium causes the clay particles to flocculate, meaning they will tend to clump up into tighter aggregates. Thus we show our clients that when needed, calcium (as determined by achieving the correct percentage for that soil) increases soil porosity and helps to loosen tight soils.

On the other hand, on sandy soils the problem is too much porosity – too much air space - allowing the soil to dry out more quickly and lose needed moisture for growing crops. Under such circumstances the soil needs to be treated in a manner that emphasizes attracting and holding more water. Magnesium is the answer, but not too much, and not too little. The proper amount for building the most productive sandy soils involves providing enough to supply at least 200 lbs./acre of magnesium - heavier sands may require up to 250 lbs./acre and yet preferably should not exceed 20% saturation for that particular soil in the process.

Note that adequate magnesium for the crop on sand or clay has great importance as a plant nutrient and for the utilization of other additional plant nutrients. Many are surprised to learn just how instrumental magnesium is at providing the greatest benefits to every crop. Sufficient magnesium is of extreme importance to assure efficient utilization of both nitrogen and phosphorus in plants.

Magnesium is a unique nutrient; it is the center of plant chlorophyll. If the soil has too little, the plants will not get enough. But whether food, feed or fiber crops, if the soil has too much, the plants can still be deficient in magnesium. This can be verified by plant or leaf testing. In such cases, not only does this limit the correct use of nitrogen and phosphate, but it also results in magnesium being deficient as a nutrient in the plants growing there. Nitrogen attaches around the magnesium ion accordingly. Without adequate magnesium, nitrogen cannot function properly and the ideal chlorophyll level, as indicated by the best of green color in the plant, will be lacking. In addition, magnesium is needed for phosphate metabolism in plants. When there is not enough magnesium in a plant, the phosphate will not be doing its job properly. Without corrective measures to needed magnesium levels, two of the fertilizers that are most often purchased for soil application to promote good

Continued on page 17

Magnesium... Continued from page 16

crop growth are limited in doing their best job and growers will fail to receive full benefit from the amounts of nitrogen and phosphate they apply to that land each year. This will continue to be the case until that soil contains the correct level of available magnesium for supplying the crops being grown there.

Additional magnesium as a foliar or in an immediately available dry form can be applied to help magnesium deficiency in plants. However, as long as the magnesium needed to correct levels in the soil is not judiciously applied there will be a continual problem for growing crops in such soils. A maintenance application of magnesium can help the current crop, but will continue to be a drain on the fertilizer budget year in and year out. Once the soil has the correct magnesium level, the expense of providing an "annual fix" becomes unnecessary. This approach works best for the crop and the farm, though many who have something to sell as a "less expensive" stop-gap measure will often try to convince the farmer otherwise. Try both ways in a small field or two on your farm over a three year period. Determine for yourself what can be done profitably before committing large amounts of money toward such a solution.

But what is enough magnesium needed to correct levels in the soil? First of all, you can be sure the answer is not just the number of pounds of magnesium present in each soil. Perhaps that should be written: It is not the number of pounds or kilograms of magnesium present in the soil that will reveal when sufficient magnesium is present for growing the most nutritious and productive crops! Farmers use our soil and plant testing program to analyze many thousands of samples from all 50 states in the US and over 75 other countries. From these tests it is easily established that if magnesium occupies less than 10% of the nutrient-holding capacity of a soil, whatever food or feed crop that is growing there will be deficient in magnesium.

Caution: Note that the caution given that calcium values are expressed differently from one laboratory to another also applies to magnesium - except there is far less room for error to avoid having a magnesium deficiency in the soil and crop. Some labs show 8% calcium when our test numbers show 12%, others may show even a different percentage. Not to say those numbers have been incorrectly determined, but that soils we would say are ideal from our testing would not necessarily appear to be the ideal when accepting the magnesium number as meaning the same thing if analyzed by another laboratory.

When there is too little available magnesium in the soil (less than 10% in clay soils, and less than 200 lbs/acre in extremely sandy soils) nutritional values come up short and the efficiency of nitrogen and phosphate is reduced. Just bear in mind, once you have enough, more is not better, because too much magnesium in the soil means the plants grown for food and feed there will not take up enough from that soil. Legumes are some of the most sensitive crops to soil magnesium levels. On soils with an exchange capacity of 9.0 or higher, less than 10% magnesium or more than 12%, will cause the crop to suffer, reduce magnesium content and crop yields accordingly. We see this over and over again with crops like soybeans and alfalfa (lucerne). And for corn (maize) crops, the higher magnesium levels are above the

Continued on page 34

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Spent hens per 4 lb b	ird (BI Crk)		S	4.0	0			Eggs - tray of 30, farm price	S	5.58 (Sp Lkt)	6.00 (Blue Creek)
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February 2016 AgReport.bz 19

Harvesting Ag News from All of Belize

BLPA News By Elba Cocom



Ever wonder how much longer the Cattle Sweep has to go before Belize can be declared free of tuberculosis? Here's your answer: the cattle industry still has 2 long years to go before being declared free of tuberculosis.

If you raise cattle you have seen teams visit your farm and get blood samples to see if

your cattle are free from disease, especially tuberculosis and brucellosis, 2 of the most common diseases in cattle (that can even affect humans once contracted).

Why is it important to test? Without testing of animals Belize cannot declare the country free of disease which means we cannot export to any other country.

What happens if you don't test? It means that you put your cattle and the rest of the country's animals at risk and you can also be fined by relevant authorities for not complying.

What are the benefits of testing? It means that you will be qualified to get a *free herd* certificate which allows you to freely sell your cattle to any local purchaser or purchaser from any other country.

The greatest effort of testing for brucellosis and tuberculosis has been conducted for the past three consecutive years for the national cattle herd of the country. Many thanks to the farmers for their kind cooperation and time invested to make these past years a great success. Our international and national experts say we are free and have the scientific evidence to demonstrate we have low prevalence of tuberculosis and are <u>free of</u> <u>brucellosis</u>. The real work starts now: Belize is required to (1) pass legislation to declare the country free of brucellosis and (2) test a representative sample of the national herd annually.

The Organization Internationale de Epizooties (OIE) establishes that we require two more years of testing. So the question to your answer is NO. The sweep has not ended.

Ranchers need to be informed that in the coming two years we will test areas that are considered high risk for the disease; this includes all dairy herds, farms that are near the neighboring countries, farms that have been hard to test or have not shown a willingness to allow the required test and the rest that will complement the representative samples of the country herd. When we reach the *free herd* designation for both diseases

we will require annual testing to keep the free herd status and ensure that exporting is not affected.

It takes everyone to do his/her part so that the new testing, which



we are calling *Surveillance System Plan* is implemented easily and effectively. Each agency and partner is required to support the testing. When farmers resist the test, they affect not only themselves and their neighbors but the whole country.

We are also looking for BLPA to become a service oriented organization.

BLPA's AGM (Annual General Meeting) will be held on Saturday, March 19th, at the BLPA headquarters in Belmopan. Registration begins at 8 A.M. and the meeting shall be called to order promptly at 9 A.M. Voting for new directors will be after lunch and the meeting is expected to conclude around 2 P.M.

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Sam Vigue Discusses Low Input Farming with Pro-Organic Belize By Beth Roberson



Sam Vigue is an American agronomist who works as a seed research specialist in Austin, Texas. He visited Belize in 2015 and returned in 2016. During the latter visit, he attended Pro-Organic Belize's January meeting to discuss seeds and *low input farming* principles.

Sam defines low input farming as using better farming systems, wherein a farmer is less reliant on external inputs for planting, growing or harvesting crops. He claims that when seeking self-sufficiency in farming, it all starts with seeds and soil.

Healthy soil works like preventative medicine. Having all the nutrients is key. Foliar fertilizer, in his view, will not work as well as maintaining the soil as a storehouse of nutrients for the plant. One of the best ways to get those into

the soil, is using compost. Then the nutrients need to be available to the roots so they reach the plant from the soil. Insects, micropests (fungus and bacteria) and weeds – all 3 are constant challenges creating the need for constant learning processes. Disease is one of the indicators that things are not right with the environment around the plant. Sam states, "It takes more knowledge to grow organically than just putting the chemicals on."

When facing a growing challenge, Sam says growers must consider what he calls *the economic injury level*, as in, "How is this going to affect my yield?" Organic growers have less options. The natural chemical for fighting almost every kind of worms is Bt (Bacteria thuringienses). Sam calls on all organic farmers to be creative, as in trying new substances and approaches, as insects can become resistant to all of these things.

Sam stated that "the more we compare growing plants to the human body, the more we can understand". He advises farmers to look for varieties from different areas that have resistance, and varieties which "thrive in your environment". He continues, "We can't be excessively hard on farmers while they are using these things [chemicals], in order not to lose their crops. We need to understand their situation and find new methods".

As a seed researcher, he commented that seed companies develop seeds for large areas, not specific areas; this creates a problem as then the seeds are not totally adapted to **any** area.

Other tidbits of information which came up during the followup questions and interchanges with the large group of listeners included:

*Harrington's seed rule (for preserving seeds): *temperature and humidity combined cannot exceed 100*.

*Regular plastic bags (including zip locs) have air exchange. There are some heavy duty bags called Seal-a-Meal bags that contain no polyvinyl chloride, that can seal air tight. Glass remains an excellent choice for seed storage.

*Silica gel may be placed with seeds to absorb moisture. Keep your seeds underground by digging a hole and placing in PVC pipe, or maintain them in cool places such as your refrigerator.

*Felix Tzul mentioned that harvesting your beans when they are ripe, and not dry, will mean less insects (weevils) in your beans.

*Felix also mentioned another traditional method of preventing insects in beans that are kept for eating and not for planting: put a small amount of vegetable oil on the beans.

Saving Heritage Seeds in Belize -David Johansen's Seed Garden and Vault By Mary Susan Loan

Since age twelve David Johansen has had an avid interest in



seeds and farming; he has lived and farmed in Colorado, Utah, Missouri, and California. Having traveled widely in Belize and Central America to procure hardy, tolerant seeds adapted to the challenging growing conditions in Belize, David developed his 35 acre farm and seed bank over the past eight years in the Spanish Lookout area with great success.

He has many crops growing abundantly to full maturity in order for him to harvest seeds to sell locally and fulfil orders for Belizean grown seeds from US seed companies.

In order to preserve the seeds in cool temperature, low humidity conditions, David designed and constructed a climate-controlled underground depository cement vault which can store hundreds of jars of seeds. His seeds have been meticulously catalogued. Keeping seeds beneath the earth helps to keep the seeds viable for sprouting. David is working on a dehumidification system to ensure the proper dryness.

David is proud of the long Chinese red beans which grow to be one to two feet long and are a beautiful scarlet color; they are delicious raw or cooked. Seeds like these of the Chinese red beans face the risk of extinction unless they are preserved for future generations. Other seeds include: plump white beans, many varieties of squash, kale, melons, eggplant, okra, and basil.



All the seeds David saves grow well in Belize; he is selective about the purity of the seeds which he has honed to be the strongest and healthiest to survive and thrive in every region in Belize's climate and diverse growing conditions. His seed company "Our Heritage Seeds" can be followed on Facebook.

<u>davidjohansenfarmer@gmail.com</u> or <u>ourheritageseeds@yahoo.</u> <u>com</u> 669-6756

David Johansen will be the speaker at the Pro-Organic Belize March meeting, to be held at Maya Mountain Lodge, Cristo Rey Rd, Santa Elena, Cayo District on Tuesday, March 1st, 2016 at 12 noon. Lunch is available off the menu while you listen. A question and answer session during which all attendees are welcome to participate, will follow the presentation. David addressed to Pro-Organic Belize at a 2014 meeting and has been invited back by public demand.

Pictures courtesy Orlando Pulido

Dairy Products at Home Hard Cheeses By Deborah Harder



In the final installment of our dairy workshop, we look at hard cheese, which is made using rennet as a coagulant. The title of this article is "Hard Cheeses" because all the hard cheeses in your urban deli are made in basically the same way, with only slight variations of temperature, time lapses, or aging times. Unique varieties have developed in various parts of the world due to the unique bacteria and climatic conditions in each place. You can try to reproduce cheese by ordering freeze dried bacteria from a catalog, or you can develop your own cheese unique to your locale - or rather *cheeses*, for each one will have its own unique "personality". The first rule of cheese making should be this: **There is no such thing as a flop; there are only new types of cheese**.

If you followed my mozzarella procedure in the last issue, you have a good start at making rennet cheese. Start with sweet milk (slightly sour also works), adding ¹/4 tsp of liquid rennet to 4 gallons of milk, or 6 drops per gallon. Use clean, stainless steel containers and utensils to lessen the chance of strange bacteria entering it. Stir the rennet in well and let it sit until you have a clean break, as explained in the November article (issue 30, pg 29). Cut the curds and let them sit for a quarter hour or so. Now, at this stage you can make queso fresco or Spanish cheese, the kind commonly available in markets in Belize. Just skip the heating step and drain, salt and press your cheese as described, but for only a few hours. This will yield a softer, mild cheese that will not keep long.

But for a sharper, aged cheese, proceed: heat curds slowly, keeping well stirred, until they are rather warm, around 100 degrees F. Then keep them warm for an hour or so. Your curds

will have become rather rubbery; they are ready to drain when a handful pressed packs together easily. Then drain in a colander. The reserved whey can also be used to make ricotta cheese, as described in November's issue 30. Salt the curds using about 3 tablespoons of salt for a batch made from 4 gallons of milk. (This should approximate 4 lbs cheese.) Now your cheese is ready to press, which will expel the maximum amount of whey, making your cheese hard and preservable. To press your cheese, you may simply line your colander with a clean white cloth, place curds inside, wrap with the cloth, and place a plate and heavy weight on top, and a container underneath. Or you can make a more professional press with something like a short length of 6" PVC pipe with a couple of pieces of wood cut round to fit inside, placed above and below the cloth-wrapped cheese. Place in a cake pan with a wooden block or other object on top, to come above the top of the pipe. Then on top of that place a heavy weight, such as a 5 gallon bucket of beans or corn. This precarious stack should be leaned in the corner of your kitchen, so as not to topple over, but it still might. Your cheese, a living breathing organism, may start to puff up overnight and even throw off its shackles, but it will not run away and it will still be cheese. Before evening, the cheese should be redressed, meaning the cloth removed, cheese turned and rewrapped and returned to the press, at least once or twice. The next day, you should have a round, smooth, beautiful cheese. But don't eat it yet! Now you can age it. Put it on a plate, cover carefully with a cloth (careful not let any flies land on it), and keep it in a warm, dry place for a week or so, turning it every day, until it develops a hard, dry yellow rind. If it begins to mold, wash it with whey or water and dry it some more. If you like milder cheeses, you can eat it now, or age it longer.

The best way to age cheese for longer periods, we have found, is to wax it. Beeswax, which can be purchased from your local beekeeper, works best. Melt it in a shallow dish like a pie pan. When liquid but not hot, dip every side of the cheese in the wax. Do this at least 3 times until the wax is thick enough to keep out the bugs. Now you can keep it for months! (After you peel off the wax, save it to remelt, strain and reuse.) Try 1 or 2 and see how you like it. *If your cheese develops an offensive odor*, due to some strange bacteria or yeast that entered unawares, remember rule #1: instead of despairing, carry it to your European neighbors, and see if they don't dub it with a German or French name, declaring that they have not encountered such delicious cheese since their last visit home. Present it to them as a gift, reserving a small piece with which to broaden your family's horizons. Then go home and make more cheese.



Spanish Lookout 2015 Crop Production Report By Spanish Lookout Community Office

Acres corn planted - Summer Acres corn planted - Winter Acres milo planted - Summer 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 Corn harvested - Summer Corn harvested - Winter White corn harvested - Summer Milo harvested - Summer Milo harvested - Winter R.K. beans harvested B.E. peas harvested Soy beans harvested **Rice harvested** Other crops* harvested

24,431 acres 2,930 acres 10 acres 735 acres 6,553 acres 5,385 acres 3,771 acres 2,190 acres 997 acres 876,713 of 100 lb bags 30,671 of 100 lb bags 91,379 of 100 lb bags 37 of 100 lb bags 20, 344 of 100 lb bags 51,508 of 100 lb bags 54,488 of 100 lb bags 54,907 of 100 lb bags 73,378 of 100 lb bags 4,648 of 100 lb bags

*Chia, small red beans, small black beans, pinto beans etc.



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Community nce 2005. Their average he lowest year on record	Rinfall - Upper Barton Creek Rinfall records have been kept for 22 years. The average annual rainfall is 75.45". The highest annual rainfall, 101.1", records	tainfall - Spanish Lookout r. David J. Thiessen and family have been keeping rainfall cords in Spanish Lookout for 46 years. Over the 46 years, the
coru 2.1". eiler	1.". was in 2006. The lowest annual rainfall, 52.8" was in 1994. aver ler We thank, Mr. Isaak Harder and Upper Barton Creek was Community for sharing this data.	erage annual rainfall is 60.31". The highest year on as 2006 with 79.72" and the lowest year was 200. .96". Thank you, Thiessen family.
	No. of days No. of Month 2015 of rain inches	No. of onth 2015 inches
	January 18 4.43 J February 5 0.03 F	January 5.8 February 0.36
	March 10 3.21 N	March 2.43
	April 1 0.7 ⁷³ May 5 0.53 ¹⁰	May 1.02
	June 25 10.4 J	June 8.32 July 4.63
	August 19 2.58 August 10 3.11 A	August 1.86
	September 15 3.13 S	September 6.16 October 2.80
	October 13 5-93 V November 24 19.57 N	November 14.5
	December 17 5.45 D	December 4.52 Art Total 54.49
ଧ	015 Total 59.98	
	10 Upper Barton Creek 14	Spanish Lookout
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February 2016 AgReport.bz 24 Harvesting Ag News from All of Belize



February 2016 AgReport.bz 25 Harvesting Ag News from All of Belize



Surviving Climate Change By Maruja Vargas San Lorenzo PermaGarden, Succotz

Climate change is the biggest challenge to agriculture in the twenty-first century. The past year 2015 was the hottest year in recorded modern history. Whether you agree that this elevation in temperature is man-assisted or a natural phenomenon, *it is a fact* to be understood and dealt with for long term agricultural production. For small farmers to survive climate change, methods of farming must be adjusted to reduce crop loss and ensure profitability at harvest. Small farmers have an advantage in adapting to the changing weather patterns. This is good news as 84% of the world's food production comes from small farmers cultivating less than 5 acres.

Modern day climate change challenging the small farmer is characterized by massive flooding (too much water), extensive droughts (no water), accompanied by widespread fires (in many places though not Belize at this time) resulting in unpredictable and incomprehensible changing weather patterns.

It appears that <u>no historically recognized seasonal patterns</u> <u>can be expected to prevail.</u> In 2015, Belize experienced both too little water (summer 3 month drought) and too much water (fall flooding) during critical planting periods. We can no longer follow "our grandfather's schedule" of planting and harvesting events. Climate change now demands that we, the small farmers, must take greater control of our cropping cycle. For future success, we need a heightened emphasis on rain water resources, collection, storage, usage and reuse. And to date, little attention has been given to water resources on the small farm.

What is the small farm solution? The cheapest place to hold water is in the soil. Key to holding water is the amount of organic material in the soil. Soil enhancement will be a primary objective. The small farm solution also will entail more cisterns/ ponds/aguadas and possibly above ground water tanks, where economically feasible, to store rain when it is available for use when needed.

To adapt to the changing planting cycles, on-the-farm "seedling nurseries" will become common practice, whereby seeds are set in trays/bags followed by controlled watering until such time as weather "seems" to be conducive to setting plants out in the field. Once in the field, hand irrigation with back packs or small cart water tanks may be needed if the weather does not coincide with the crop schedule. Small farmers will begin to introduce more permanent (perennial) edible cultivars that will assist in

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Large Tree Cover • 1 mi to Maya Flat Air Park Surveyed • Fee Simple Title • Off Grid At San Lorenzo PermaGarden holding moisture in the soil, controlling run off, reducing soil erosion and soil nutrient loss. Soil enhancement and more vertical perennial cultivars contribute to the mitigation of the factors underlying climate change. Soil is quickly becoming recognized as vital for its ability to store carbon, as do vertical crops such as trees.

As for Belizean farmers, it begins to appear that the traditional May through September period for planting may no longer be "predictable". For example, October-November 2015 was the time we set plants out (for a second time!) into the garden/ field hoping that as a result of shorter days and more cloudy weather, the growth cycle of plants would be prolonged. My personal experience at PermaGarden this year was a big loss; 1500 tree cuttings, 3500 grass cuttings and \$800 is grass seed were lost due to the drought. Following advice of a fourth generation local farmer, we put the cuttings directly into the ground in May, as "this is the time of year to plant". Then came the drought. No rain, and no rain; 1499 trees dried and did not root. There was one survivor that was under partial shade. Had we followed our normal operating procedure and bagged these cuttings, we would have had 1499 trees rooted, leafed and ready to set out when weather dictated. Grass did not germinate and had to be reseeded at a second expense. Small farmers cannot survive with these types of losses.

Next article in the small farm climate change series focuses on details of water 're-management'...what will be needed in the new era of small farming on our planet given the unpredictable weather patterns. Till then.....Send questions or comments to san.lorenzo.permagarden@gmail.com



Life Everlasting Plant By Mary Susan Loan

The succulent herb Kalanchoe pinnatum, sometimes



called **Bryophyllum** pinnatum, has many common names: life everlasting, miracle leaf. cathedral bells, wonder plant, never die, leaf of life, sprouting leaf, resurrection plant, mother of millions, and many other names. It is a member of the Crassulaceae plant family. Native to Madagascar, it grows prolifically in Belize and other tropical regions of the world. The plant grows easily

and although it is valued as an ornamental garden plant, it is considered an invasive species in some areas. Life everlasting is believed to be a panacea for many ailments. It is rich in over two dozen healing chemical compounds, including, alkaloids, triterpenes, glycosides, flavonoids, steroids, and lipids.

Life everlasting plants are perennial and grow to be about three to five feet in height with fleshy green leaves from two to four inches long which may be tinged with pinkish to purple on the scalloped outer leaves. Plants produce clusters of showy hollow tubular flowers, about one inch long on tall panicles with a pale pinkish to purple tinge at the base of each blossom.

It is common practice in some parts of the world to eat one fresh leaf a day to help maintain good health although use during pregnancy and extensive use are not advised. Leaves have a juicy sour texture and taste. Leaves may be diced and added to a salad or soup or smoothie. Next time you are bitten by an insect, or have a skin rash, pick a few leaves from the plant, crush them and apply their juice to the affected area. If you have a cold, mash a handful (about nine or ten) leaves, add them to a quart of warm water, strain and drink one half cup every few hours to help alleviate cold symptoms.

Life everlasting was used as a medicinal aid for the early navigators and helped to spread distribution of the plant to world-wide tropical locations. Medicinal uses of life everlasting include crushing of the leaves to extract the juice and applying it to wounds, sprains, swelling and inflammations. Leaves roasted over a fire are applied to surgical sites to help with healing and to prevent discoloration of the skin. A water extract of the leaves administered topically and internally as a tea has been shown to prevent and treat symptoms of leishmaniasis (a parasitic skin disease). To alleviate respiratory issues and wheezing of asthma, leaves are heated, the juice extracted and mixed with honey to take by the spoonful until symptoms clear. The leaves are proven to have antibacterial, anti-tumor, analgesic, antifungal, antihistimine, antiviral and are used as a sedative as they contain gamma aminobutyric acid (GABA) which is a neuro transmitter in the brain. Juice from the plant

leaves is also used as a beauty aid when leaves are crushed and applied to skin as a moisturizer. The leaves, processed in a blender with water to a liquid state, then strained and added to shampoo is used to condition hair.

Life everlasting plants are grown in all kinds of soil conditions starting from seeds, suckers on the base of the plant or by formation of small plantlets which grow along the edges of the leaves. When leaves fall to the ground, they rapidly colonize the plant which grows well either inland or in coastal areas. Plants grow best with at least four to six hours of sunlight daily and periodic watering during the dry season. Life everlasting may not be a commercial row crop in Belize, but it ranks high as a useful healing and ornamental plant for the garden or sidewalk border. It is best planted where there is space for it to spread as a tall attractive ground cover. It fills in and softens the corners where fences meet. Plant some life everlasting near your aloe vera for an attractive pairing and convenience in harvesting the succulent healing leaves.

loanmarysusan@gmail.com



Pro-Organic Belize Seeks Pesticide Residue Tests for Local Produce, Visits BAHA's Chemical Analysis Laboratory By Dr. Stephen Zitzer



On 25 January 2016, a group from Cayo's Pro-Organic Belize visited Belize Agricultural Health Authority (BAHA) Central Investigation Laboratory (CIL) in Belize City. We met with Laboratory Administrator/Deputy Director of Food Safety Dr. Natalie Gibson and her head chemist for the Chemical Analysis Laboratory (CAL) to tour the recently renovated laboratory facility and discuss the pesticide testing capabilities of their laboratory for both public and private needs.

The CAL is located in the BAHA complex located on St. Joseph Street in Belize City, with the sample storage and preparation rooms separated from the sample analysis rooms. Sample processing will be greatly improved by the acquisition of two new processing machines. The sample analysis rooms contain several gas chromatographs, heavy metal analysis equipment, supplies and computers. This equipment is capable of detecting quantitative amounts (in parts per million or ppm) of specific molecules used to identify specific pesticides. Much of the equipment, donated by international agencies, is relatively new and being calibrated for the climate, soils, crops and most likely pesticides to be found in produce bought in Belize, whether grown in Belize or imported. Unfortunately, these new pesticide testing methods are relatively costly and therefore may not be used on a regular schedule until more funding is available for implementation of the pesticide residue monitoring program being developed by Food Safety Services of BAHA. Nevertheless, CAL is currently using several bioassay methods for determination of the presence of general classes of insecticides and fungicides. We also learned that testing for genetically modified organisms (GMOs) is conducted at central farm and that no testing is being done for the widely used herbicides glyphosate and atrazine.

The major challenge facing the future of CIL and CAL in terms of being capable of processing the large number of produce samples required to effectively assess pesticide residues in produce from the large number of produce markets, is acquiring sufficient funding for trained personnel and supplies needed to operate and update both sample processing and sample analysis labs. Besides the obvious and urgent need to test for acceptable levels of registered pesticides in produce, there is also a growing group of consumers including POB that would like to be able to verify produce as pesticide-free so it can be certified and or labeled as Belize organically grown produce. Fortunately, Belize can learn from many other countries that already have well-funded, hightech pesticide monitoring programs in place and choose from these programs the elements that would be beneficial and most cost effective for securing the food safety of future generations of Belizeans.

Editor's Note: Pro-Organic Belize and its members join a growing number of Belizeans who are concerned about the safety of fruits and vegetables, both local and imported, that are sold in area markets. Belize Ag respects the efforts made by BAHA to comply with this rising demand for testing, and realizes that BAHA would willingly supply more testing if they had the capabilities in manpower, equipment and supplies necessary to do so. Belizean exporters are able to use costly foreign labs to guarantee the safety of their products. What is the Belizean consumer to do until funding for residue testing moves up the priority list?



Planting and Harvesting Beans -The Mayan Way By Felix Tzul



Beans have always been a staple for the Mayas. They have a large variety of beans: Boloc' che, Tzama (red & black) variety, Xchalaatbuul, Xme-hen bu-ul, and Xpascuabu-ul. They eat beans almost daily with rice and tortillas. Their diet is also complemented with cowpeas which are planted during the months of June

and July to be eaten starting in late October for the observance of All Saints Day or Finados. Local lima beans are also cultivated for the preparation of the special Mayan dish called Xtoc sel.

Many of the Mayan beans are large with a thicker skin and have much more "bean" pulp than the typical black or red beans grown in Belize. (See issue 15, page 18 of the Belize Ag Report for a more complete description of Mayan beans.)

If you want to grow and harvest beans the way the Mayas did and many still do, here's what you should know:

Local Mayan selected beans are photo-periodic and grow better when planted during the months of August or September. Beans planted in late September or early October have less vine (vegetative) development before flowering. As the day light length decreases it stimulates the bean to flower. It usually takes about 3 months for

most Mayan beans to develop pods. If you want to grow the beans only for nourishing the soil with nitrogen, plant after the dry season, usually in June. The beans planted in June are mostly vines and do not flower until the month of November. Beans for this purpose are usually plowed under to maximize nitrogen fixation.



The method of harvesting beans depends on what you intend to do with them. If you intend to eat them you should pick them ripe (which is indicated by the color of the pod) before the pod dries and turns brown. Dry the harvest-ripe beans by hanging the pods to dry in the sun until the pods begin to explode, a clear sign that they are properly dry and ready to be shelled and stored. Place dry pods in a clean bag and beat it to release the bean and then winnow the smaller trash before storage. Dry pods may also be stored in large baskets made of bay leaf and white lime added to discourage weevil infestation. The beans harvested and left in the pod tend to cook better and softer than those left shelled and dried under direct sun light.

Regardless of the method of harvest and drying, most Mayan beans need a longer cooking time. Like most beans, soaking them overnight reduces the cooking time. If you soak them overnight the cooking time is about $2 \ 1/2$ hours. If you cook them in a pressure cooker they can be cooked in 30 - 35 minutes. Of course, the Mayas cooked beans in a large pot over an open fire; it took many hours to cook them. The fire hearth gives beans a special taste and aroma.

The Mayas always saved beans for the next planting. The bean pods left on the vines to dry are usually weevil infested and not used for this purpose. Well developed and full pods that have the unique characteristic of the variety are selected, manually shelled and grain selected for the next planting season. This is done just before the planting date.

If you want to save beans for the next planting be sure to store them in a jar or other air-tight container to keep them dry. The Mayas stored them in the bay leaf basket (Nas-haac'). Beans stored in this manner remain viable for only one year. In our modern day, dry selected bean seed can be stored in an airtight container or Ziplock bag in the refrigerator and will remain viable for 2 to 3 years.

Mopan Technical and Vocational High School Agriculture Program By Mary Loan



Mopan Technical and Vocational High School in Benque Viejo del Carmen, Cayo District, the agriculture science program offers students sound practical hands-on courses designed to

prepare students for a career in agriculture. In addition to animal husbandry skills, the program focuses on teaching students how to manage soil and organic matter, sow seeds, tend plants and harvest in the fields and in green houses. The program also includes courses in the sciences and finances, complementing the field work, to round out skills needed to successfully manage a farm or teach agriculture. In order to graduate, students must pass the Caribbean Examinations Council (CEC) Agriculture Science exam.

Mr. Francisco Tun, principal of the high school has a commitment to prepare students for careers in agriculture which will help support food security in Belize. The agriculture program is managed by Mr. Kendall Mendez, who has been instrumental in the development and success of the vocational agriculture department of the school for over thirty years. Mr. Mendez explained that the students follow a four-year format of agricultural science syllabus to successfully pass the exam of the CEC. About fifty percent of the students in the program go on to further their education in university programs.

The fifty three acre campus includes an area of one hundred mahogany trees, poultry buildings and pig production areas. There is also a talapia fish hatchery. Green houses and fields are growing crops year-round. The students of the Mopan Technical High School Agriculture program were instrumental in making World Food Day, which was held on their campus, a great success. They gave tours and provided attendees of the event with plant seedlings.

The graduates of Mopan Technical High School are among the leaders of the future of food production and security in Belize. Other schools are encouraged to follow their example of encouraging young people to pursue careers in agriculture.

ASK RUBBER BOOTS

After a long hibernation, Rubber Boots returns with a few suggestions for biofriendly plagacides (new word for pest controls).

Do pesky **drunken baymen** (*Trigona*, the largest genus of sting-less bees) gather around your hummingbird feeder? Try a few dabs of coconut oil on the feeder and see the drunken baymen disperse.

Fruit flies (*drysophila*) in your kitchen? Put a few small dishes with a small amount of *real* vanilla extract out; that is what commercial produce departments of grocery stores do (or used to do in the days of yore) to encourage them to simply go away.

Bugs eating your beans? Sometimes this is a sign of low magnesium. Try spraying with epsom salts, 1 Tbs per gallon (5 lbs per acre). Even if your soil has good Mg Levels, it may be 'tied up' and unavailable to the plants (Thank you, Neal Kinsey).

Do **gastropods** bother your garden? What *is* a gastropod? From the Greek words for *stomach* and *foot*, it is a large family of animals including **snails and slugs.** These *walking stomachs* are one of very few groups of animals who are successful in all 3 major habitats – oceans, fresh water and land. They live in every climate, from near the Arctic and the Antarctic to the tropics. Now, how to get rid of these adaptable critters... One action to make your garden less attractive to slugs is to water your garden in the early morning rather than night, as slugs prefer a wetter environment and they are active at night.

Try spraying plants infested with slugs with a 5 to 10% ammonia solution. This is best done at night, also the dawn dampness mitigates the harshness of the ammonia. Test a small area first to be sure your plants will not burn from the ammonia. Some gardeners affirm that slugs are attracted to beer. The alcohol in the beer destroys their body tissue. Sink a cup or plastic container into the ground and fill half way up with beer. Change beer daily or at least every 3 days. Some sources say dogs and cats may enjoy the beer too, so be watchful.

The site pestcontroloptions.com also informs that human hair clippings will cause slugs to get tangled up, strangle themselves and die! Also, human hair is a great fertilizer high in nitrogen. What are your hairdressers doing with all their hair clippings?

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



SHI-Belize job opportunity for country director in Punta Gorda. See details in link: http://www.sustainableharvest.org/ employment/

Pro-Organic Belize (POB) Speakers Calendar

March 1st, 2016: The POB guest speaker will be Mr. David Johansen of *Our Heritage Seeds*.

April 5th, 2016: The POB guest speaker will be Mr. Abram Harder of *Variety Fruit Nursery*, Barton Creek

May 3rd, 2016: The POB guest speaker will be Mr. Bill Lindo of *Lake 1 Development Company*, to discuss Energetic Agriculture.

POB meets the first Tuesday of every month at noon and the regular venue is Maya Mountain Lodge, ³/₄ Mile, Cristo Rey Rd, Santa Elena, Cayo District. Lunch can be ordered off the menu during the meetings. Lively question and answer time follows the presentations. Everyone is welcome. Call 677-9658 for more information.

Know your Farmer.. Know your Vendor =Safer Food for Belize





The National Agriculture and Trade Show (NATS) has been scheduled for April 29th - May 1st 2016. Contact cao.secretary@agriculture.gov.bz for more details on booths.



Spanish Lookout's 4th **Bi-annual** and Industrial Commercial Expo is scheduled for Friday Feb 26th and Saturday Feb 27, 2016 at Countryside Park, Spanish Lkt. Information: businesschamberspl@gmail.com

The Belize Livestock Producers Association (BLPA) will hold their annual general meeting (AGM) on Saturday, March 19th, at their headquarters located at Mile 47 ¹/₂ George Price Hwy, Belmopan. More information: <u>blpa@btl.net</u> or 822-3883. Registration will



begin at 8 AM and call to order will be at 9 AM. Booths are available for businesses which interact with the livestock sector.



The Chocolate Festival of Belize will be held over Commonwealth Day weekend, May 20th to 22nd, 2016, in Punta Gorda, Toledo District. Contact <info@chocolatefestivalofbelize.com> or call 722-2531.

The University of Belize College of Agriculture at Central Farm (UBCF) will host prominent soil fertility expert Neal Kinsey for the 3rd time in Belize, on February 27th -March 1st 2017 (the 2016 course was held earlier Feb 2016). The upcoming course will be a new course to Belize; the 3 day Intro



2 Course, begins with a day and a half of trace minerals. Workbooks for the new course are available (now) for paid registrants of the next year's Intro 2 Course. All are welcome to attend this course - students, teachers, private sector. Contact David Thiessen at 670-4817 or thiessenliquid@ gmail.com . Neal reports that this is "the favorite course" of farmers.

The Belize Tourism Industry Association (BTIA) is planning a

CornFest to be held in San Ignacio, September 2016. Details contact rayleeaust@yahoo.com or call Lee at 667-2740.

Pro-Organic Belize meets monthly

in Santa Elena, Cayo District, on the first Tuesday of the month with a speaker. Details on pg 31. All are welcome.



In 2016 Taiwan bans GMOs from school lunches (School Health Act) and mandates GMO labeling nationwide (Food Act Amendments) on foods that contain 3% or more of GMOs. In 2015 imports

of non-GMO soybeans into Taiwan grew 300%. Taiwan's pig farmers are organizing against the pressure from US pork industry's use of Ractopamine. Imports of US pork fed with Ractopamine are currently banned.

Fruta Bomba Ltd., headquartered in San Joaquin, Corozal District, Belize's largest papaya producer, announced in early February



Local and Fuel		d Regional Prices		
		Cayo,	Quintana Roo,	Peten,
1	· · · · · · · · · · · · · · · · · · ·	Belize	Mexico	Guatemala
	REGULAR	\$7.78 Bz/Gal	↓ \$5.53 Bz/Gal	♦ \$6.37 Bz/Gal
	PREMIUM	\$9.40 Bz/Gal	↓ \$5.87 Bz/Gal	↓ \$6.66 Bz/Gal
	DIESEL	↓ \$6.37 Bz/Gal	↓ \$5.79 Bz/Gal	↓ \$4.92 Bz/Gal

that it will close down its Belize operation. Agriculture CEO Jose Alpuche and others are hopeful that the company might instead find a buyer for the operation.

Mr. Belarmino Esquivel, Director of Extension. MAFFESD (Ministry of Agriculture, Fisheries, Forestry, Environment and Sustainable Development) shared data at the National Agriculture Climate Change Forum, held on



February 17th, 2016. The losses countrywide caused by drought, between June and August of 2015, exceeded \$28.3 M Belize \$. Note, this does not include the losses incurred by farmers from our excessive rains of October and November of 2015. Look for more information on our website and in issue #32 (May).



Zitacuaro in Mexico's Michoacan state, is the site of the world's first biogas (methane) digester making biogas from (pureed) prickly pears mixed with manure. The 8 tons

daily production fuels the Zitacuaro town hall's vehicles. NopaliMex is operator of the plant; the concept for it originated with Nopali Mex owner Rogelio Sosa who was looking for options for cheaper fuel for his corn and cacti chip company. The gas from the plant can generate electricity for homes at 50% less than grid prices. Mexico passed a "green law" recently, requiring renewables to provide 35% of the country's electricity needs by 2024.

The China National Chemical Corporation, aka ChemChina (state owned by China), has offered to purchase Swiss seed and pesticides giant Syngenta, for \$43 Billion USD, as China moves to ramp up to meet domestic food security needs. Monsanto had attempted but failed to purchase Syngenta last year.



The Santander Group (formerly Green Tropics) of the Yalbac area, Cayo District, expects to begin its first cane harvest in early March. Santander is the first Belizean commercial sugar company harvesting all their cane in the green state (unburned). The Sugar Industry Research & Development Institute, (SIRDI), located in Corozal District, also harvests all their cane green. Santander anticipates selling most of this year's

and next year's sugar to the EU. They expect for the 2017 year, circa 800,000 tons of cane (yield approx. 80,000 tons sugar plus 50,000 tons molasses). Santander will also have energy available for the grid.

Continued on page 33



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.



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

AG BRIEFS

Continued from page 32



In a December 2015 session of the National Assembly of Venezuela, what has been called "one of the most progressive seed laws in the world" was passed, and soon after signed into law by outgoing President Nicolas Maduro. This very comprehensive piece of legislation is not

only anti-GMO, but anti-patenting of seeds too. The law also regulates the production of hybrid seed, rejects the production, distribution and importation of GMO seed, and bans transgenic (GMO/GE) seed research in the country.

At least one grower in Belize has been producing Sea Island Cotton in Northern Belize for several years, for buyers in Japan. In recognition that Belize has the capacity to produce very high quality cotton for export, **Japan made a grant** of \$102,029.00USD in mid-February to the cotton industry in Belize.





St Vincents and the Grenadines Prime Minister Dr. Ralph Gonsalves is promoting replacing "the disastrous banana industry" with marijuana growing as an alternative cash crop. Dr. Gonsalves

opined to the University of the West Indies (UWI) "that the 50 years of commercial banana production has been the most environmentally degrading commercial agricultural crop since conquest and settlement". He continued, "The extensive spraying of the banana plants, the sleeving of the banana fruit with plastic, and the wanton misuse of pesticides, have polluted streams



Belize Marketing & Development Corporation



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and rivers, degraded the land and caused unwanted debris, including plastic, to be deposited on certain beaches and in the seas." The Prime Minister called for a collective Caribbean approach to study the trade and other benefits of marijuana cultivation to the region. Dr. Gonsalves stated that "In the changing global context of marijuana use, Caribbean economists and other relevant professionals, including those in the pharmaceutical industry, ought to be ahead of the curve in conducting relevant research, not rehearsing traversed territory."

Meanwhile, other Caribbean and Central American neighbors have moved increasingly towards certified organic production and bananas grown in more environmentally friendly ways.



The Inter-American Institute for Cooperation on Agriculture



(IICA)'s Country Representative, Dr. Dowlatt Budhram, announced at the *National Agriculture Climate Change in Agriculture Forum* in Belmopan on February 17th, that former Belize IICA Country Representative, Dr. Muhammad Ibrahim, has been appointed to head up the Tropical Agricultural Research and Higher Education Center, (CATIE), effective March 1st, 2016. Even before his appointment as IICA Country Representative to Belize, Dr. Ibrahim had traveled to Belize many times beginning in the 1990's, being involved in the continuous development of Belize's agriculture sector. Many in Belize's agricultural sector hope for continued input from Dr. Ibrahim, from his new position. Congratulations and best wishes to Dr. Ibrahim.

In early February 2016 the journal *Science* published an article with some astounding information regarding the effects from planting trees in Europe since the 1750's. **It is now apparent, that not all trees are equal in their climate change mitigating effects.** Since the 1750's, there has been a 10% growth in the size of



Europe's total forests (a gain overall of 76,000 square miles of forest). However, of that, conifer trees (used in building materials and in pulp) expanded by 244,000 square miles, while broadleaf forests shrank by 168,000 square miles. The lead author of the study, Kim Naudts, told Reuters, "It's not all about carbon" adding that forest management needs to look at factors such as color and changes to moisture and soils. **Lighter- colored broad-leaf trees, such as oak and birch, reflect more sunlight. Darker colored trees such as pines and spruces trap the sun's heat.**

Continued on page 34

If you want to go quickly, go alone. If you want to go far, go together. African Proverb





The Dow Chemical Company and DuPont announced in December 2015 that they would merge into a combined company called DowDuPont, which would have a market capitalization of approximately \$130 Billion USD. In February of 2016 the company made public the proposed structure of the

3 companies into which DowDuPont will morph. The most interesting

to many of the 3 newly created businesses is the agriculture company which will be headquartered in Wilmington, Delaware and feature DuPont in its name.

Magnesium... Continued from page 17

ideal for each soil, the more nitrogen it requires to produce the desired yield.

If your soils and/or crops indicate a need for magnesium, at least check with someone you trust to be sure that there is adequate magnesium in the soil for plant use and nutritional values.

As a consulting company that specializes in building soil fertility for profitable crop production, whether for more yield, higher quality, or both, our business is built on providing the proper information for the specifically needed fertility program. We do not sell fertilizer or plant nutrients required for the land, just the advice concerning how to use them for the greatest benefit. As we provide advice only in order to increase soil fertility and make growers more income, we charge a consulting fee for providing that service. If this sounds like a reasonable program in order to learn and utilize better management of magnesium, or any other required nutrient, to better achieve the benefits each will provide when applied in the proper amount, we would be pleased for an opportunity to help.

Kinsey Agricultural Services www.kinseyag.com/ (573) 683-3880

Watershed Management... Continued from page 12

beneficial experiences from which we can learn. Several national initiatives can contribute toward this holistic approach, among them being the National Integrated Water Resources (NIWRA) Policy and the National Land Use Policy and National Integrated Planning Framework for Land Resource Development. But these need to be complemented by and complementary to other landscape level policies and strategies, to comprehensively address the challenges of sustainable development in Belize.

http://www.rdrwa.ca/node/27

Editor's Note: Belize, having the highest per capita fresh water in the region, is blessed. Two-thirds of people in Central America are on the western side of the watershed divide, yet two-thirds of the fresh water is situated on east side, hence, Belize's extremely good fortune sitting east of the divide. Outsiders, notably North American corporations, (several beverage producers) have been scouring Belizean lands for several years for purchase just for the water on them. The Belize Ag Report will focus on this valuable asset in future issues, both for domestic and potentially nondomestic use. Will water become an exported resource?

Waste Management .. Continued from Page 15

method designed to reduce the total use of environmental resources by repurposing materials into new products and shipping them as far away as Korea and China. I like their mission statement; I have implemented a *reduce, reuse, and recycle* mind set in my own household. Recycling saves money and helps the planet at the same time; hard to argue with that train of thought.



Many more recycling companies have popped up in the last several years. The Recycle Network of Belize is run by Belize Tourism Industry Association (BTIA). The products of Resource Recovery Recycle Limited

are designed to strengthen the tourist industry in Belize by promoting our country as eco-friendly.

When I was working in Afghanistan in 2012, my company was awarded a contract to shred, bail and transport the millions of plastic bottles the Ministry of Defence (MOD) soldiers from the UK were using for water. We were to transport the loads of bailed plastic to Pakistan for recycling, and the money earned would pay for the expenses; the MOD/UK were doing their environmental part, even in a war zone. Sounds great, but as world events are sometimes unexpected, we lost six trucks and their drivers to roadside bombs, which brought a quick end to the contract. Now, in a much more current trend, the low oil prices we are enjoying in the form of low gas prices, means that the plastics (made from petroleum products), are not being purchased at the moment due to these same low prices, and recycling is currently at a standstill in Belize.

I will personally trudge on, and keep separating and delivering my recyclables to be stored (I hope), until such a time as recycling efforts pick up again. I will use my daughter's arrival back to Belize to help keep me motivated, and of course without her knowing, this will be her future job; all about the youth - right!

Sustainability is simply adjusting your lifestyle so that future generations will have resources to sustain themselves. Step back and take a hard look at ourselves, and the way we look at the entire world. The planet has been "speaking" to us for many years now..... remember that Pine Bark Beetle article, you will soon come to the conclusion that everything in the environment is interconnected and your actions can have worldwide consequences. How you view and love the world evolves from your heart and mind. Recent events have helped me change my thinking from "Look out, World; here I come" like a bull in a china shop, to choosing my footsteps more carefully to consider the people around me, and the world that interconnects the entire population.

Please, if I have missed anything or anybody, email me and we will do a follow up to this article, and let my environmental solutions knowledge be of assistance to anyone who wishes to learn more through training, or wants to establish a transfer station in more remote locations (like the Pine Ridge), and I will assist in establishment and the transportation arrangements of your collection/recycling areas. Think globally, act locally, is old hat. Change your heart and mind-set, and give the planet a chance to catch up with the changes we have heaped on it!

Questions and comments to Forrest at: forrestbugmaster@yahoo.com



Safe Fed: No hormones, No Steroids, Non-Anti-biotic fed It is important to know where your food comes from and to know that it is being produced in a safe, healthy, and ecologically friendly manner.

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