



# The Belize Ag Report

*Belize's most complete independent agricultural publication*

Issue 13

Sept-Oct 2011



## Leaf Cutter Ants

### The Largest Farming Population of Belize...

By Greg Clark

When we think of the scale of farming in Belize, we think of large citrus, sugar cane and corn fields, stretching for miles. We can visually see the organization, scale and precision of the planning, production and harvest. All of these efforts are carried out through the thousands of farmers in Belize working directly and indirectly with each other. The farmers' interaction with each other creates the agriculture industry that we currently have. This is actually minute to the largest scale farming community in Belize. The community that I am referencing is the colonies of the *leaf cutter ant* that farm much more land in Belize than any other farming operation. Leaf cutter ants are farmers due to collecting leaves and cultivating a fungus that subsequently grows on the leaf particles in the nest. Their organization is enacted with the precision of the military. Most colonies contain over 1 million worker ants. The costs associated with the colonies in North and South America is estimated at over \$1 billion US per year. On a secondary note, they are important in building soils over the regions.



*Continued on Page 6*



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## Belize Forest Fires 2011

By Derrith Roberson

**Overview:** This year Belize was affected by the worst forest fires the country has ever seen. The targeted areas were the grasslands and pine forests countrywide. Additionally, due to Hurricane Richard, a large portion of broadleaf forests in the central area of Belize was also affected. Most of the fires were caused by people starting small intentional fires, such as for a slash-and-burn milpa, hunters, and in rare cases lightning also contributed. This year's dry season was also said to be much drier than usual, adding to the intensity of the fires.



**Before the fires: Hurricane Richard** To quote Jan Meerman in the June 7<sup>th</sup>, 2011 *Provisional Report on the Belize 2011 Wildfires*, "Although [hurricane] Richard was only a category 1 hurricane, the damage to forest was extensive" with a total approximate damaged area of 2,391,000 acres (968,000 ha). This damage led to more debris than usual, creating ideal conditions to feed a forest fire. More specifically, "what happened in the broadleaf forest is that the canopy was taken away so the moist conditions of soil and organic matter that are normally present were not there to help protect the forest from fire." (Jeff Roberson).

**Yalbac Ranch:** This year's forest fires began to appear in February, but worsened as the year went on, reaching a peak during the month of April (Meerman). Although the fires at first

did not receive much national attention, private landowners and other stakeholders including the Forestry Dept., Yalbac Ranch, the Belize Zoo, Hidden Valley Inn, Blancaneaux Lodge, Five Sisters Lodge, Belize Natural Energy Ltd., Bull Run and TIDE stepped in to help (Meerman). According to Jeff Roberson, Manager of Yalbac Ranch, the fires on the ranch started April 12<sup>th</sup> and went on through to June 9<sup>th</sup>, when simultaneously they had gotten the fire contained and a couple days later it began to rain. When asked about the method used to fight the fires, Mr. Roberson comments, "In the broadleaf forests we used bulldozers to open fire lines and water trucks to help control the spread of the fires once the fire lines were opened. On the grasslands and pine forests, bulldozers and graders were used to reopen and open new fire lines along with a control method of 'back burning.'"

**Looking into the future:** Commenting on the effects of the fires, Mr. Roberson added that "Time will tell; obviously there is quite a bit of damage, but "Mother Nature" is wonderful... constantly reclaiming what's hers. The trees are going through stages now where time will show the extent. There are trees that are dying and at the same time, hopefully, more trees are healing. Right now in most cases it's hard to tell which way the trees are going. On our property, more than 50% of our acreage was affected by the hurricane in various degrees from broken branches to completely up-rooted trees. All of this of course will become fuel for the next upcoming 'fire season.' This year we managed to contain the fire on about 26,000 acres of our land; next year this will be in jeopardy of burning again along with the other hurricane affected areas. If the farmers and hunters are not educated in the dangers of unmanaged fires, we (the whole country) can expect a much larger threat this upcoming 'fire season.'"

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## TO THE EDITOR

RE: "Grid-tied Solar Power, A Winning Idea for Belize" by Mark Miller, Belize Ag Report June-July 2011, issue 12

Dear Editor,

Within the framework of supplying energy by using solar energy, I have no quibbles at all with Mark. On the contrary, it all makes very good sense! Taken in a wider context, I'd like to add a few points worth consideration.

- 1: ALL energy produced anywhere in the world is used and ultimately turns into heat at locations often quite distant from its generation point.
- 2: We the consumers (meaning ALL the people in this world) want to use more devices of whatever type for whatever purpose, so we want to use more power.
- 3: We the producers (meaning everyone involved in inventing, designing and producing all power-using devices) do not invest enough effort and resources to make energy-using devices more efficient, and/or using methods that cost less energy OVERALL to reach the same goal.

Mark's suggestions re grid-tied solar systems are an excellent way to go in the sense that it reduces the need for BEL to expand/improve its network of power delivery systems. It does however place an energy-cost at the grid-tied solar systems; the apparatus needs to be produced, transported, and the heat otherwise released into the environment at the generation-location now gets moved to a different location.

What I'm getting at is that it doesn't really matter that much what method we use to generate power. More important is that most of that energy ends up ELSEWHERE. And heat is the prime creator of and influence on the weather of this our planet.

So if we want to be truly effective in global climate change, then we the consumers need to turn to using LESS power, not more. We need to turn to devices that are more efficient.

Example: Using an air-conditioner in a wooden building with a single sheet of dark metal roofing is very wasteful of energy. The first step should be to make the house cool itself naturally as much as possible--of course within decent limits. Replacing that dark roof is wasteful; add a second roof instead above it of light-colored material, with a good air gap between the 2 roofs to let the roof cool itself by outside air moving between them and thus removing heat. Replace the walls? Same thing; add a second outside layer that acts as a chimney to draw outside air past the inner wall to cool it. These two changes would in many cases already cause the AC to not be needed anymore. They are the most extensive ones, but there are many possibilities that are less intrusive, less costly, and almost as effective. Oh, I didn't mention the cooling effect of tree shade? Shame on me! An idea Mark might consider applying to PV-panel installations is including a panel cooling system. PV panel efficiency of goes down as its temperature increases. Cooling tubes attached to the back of these panels reduce the panels' working temperature, thus increasing their efficiency.

*Continued on page 20*

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## MADE IN U.S.A. EXHIBIT Agriculture Presentation by John Carr-

August 19<sup>th</sup>, 2011

United States Ambassador – Honorable Vinai Thummalapally, It is my great privilege and pleasure to speak to this gathering this morning on behalf of myself and Beth Roberson representing the Belize Ag Report. I have spent my entire life around livestock and farming. My cowboy hat has been

part of my attire since I was 4 years old. I moved to Belize full time in 1977 which is more or less 35 years ago. I have spent 1/2 my life in beautiful Belize and 1/2 in the great United States. “What a deal”



### AGRICULTURE IMPORTS FROM THE U.S.

In agriculture, I would venture a guess that more than 90% of all farm tractors, trucks, plows, combines, caterpillars, planters, spray airplanes and other machinery comes from the U.S.. Loads and loads of farm machinery have rolled down through Mexico and a lesser amount by ship. Also seeds, chemicals and fertilizers come down here from time to time in great amounts. When we harvest our crops we usually import scales, dryers and storage tanks to store the grain. The U.S. is definitely Belize's largest trading partner in farm iron.

### BELIZE EXPORTS TO THE U.S.

As an exporter, Belize has shipped at times sugar, citrus concentrate, bananas, papayas, black eyed peas, beans, fish and lobster to name some of our exports to the U.S.. The U.S. also assists us with dealing with citrus greening and other sanitary issues. One of the biggest benefits for Belize was the total eradication of screw worm flies. This required a lot of ground personnel as well as dropping sterile flies from air planes to come down and mate with our female flies and produce NO-o-babies- Total eradication – Thank you U.S. for that financial assistance.

### FARM PROFILES

We must profile 4 groups that have different research, production and marketing situations. We cannot speak of them as one in the same because they are so different-

**Group # 1 –TRADITIONAL FARMERS** – a. sugar cane b. citrus c. bananas are totally different. You have growers, factories and global marketing requirements of which there seems to be conflict, and there seems to be a need for financial lending or a bailout. Their figures are usually in millions.

**Group #2 – COMMERCIAL FARMERS**- usually independent operators with a 100 or a 1000 acres of production. He farms with tractors, combines, aerial spraying and other often times skill required equipment. He usually plants 2 times a year and sells to the local markets. However, because Belize has such a small consumer base he must export his products or instead of expansion we will see regression. His crops usually are corn, beans, black eyed peas, soy beans and rice to name the majors. His exports are very important for balance of trade, creating jobs and earning foreign exchange. He is always thinking about expansion and improving farm processes and higher yields. This farmer must have access to tens of thousands of working capital and sometimes more than a million. It is important that he be able to access large amounts of credit at a reasonable interest rate. Developmental interest must be from 7% to 10% based on the client's collateral and his ability to pay back. Interest rates at 11% to 14% are out of the question for this type of production and expansion. The most important aspect in this farmer's credit line is that he pay back the loan. Farmers in this project look at 5 to 10 years to meet their production and financial objectives.

**Group #3 SUSTAINABLE FARMERS**- this farmer usually has 25 to 50 acres and considers it a family farm. They all work together growing what they eat and selling some surpluses to raise cash for school and other expenses. This farmer finds it difficult to raise product for export and he has little knowledge of farming with modern equipment, production and storage. Sustainable farmers make up the majority of the farm population in Belize and they are very important. They provide most of the fruits and vegetables that you see on the shelves and in the market place. They usually develop youth that know how to survive and work hard. These farms usually provide a superior family lifestyle. There is also a lot of improvement that can be made by learning about new seeds, fertilizers and other products that will increase their yield and reduce their costs.

**Group #4 NICHE FARMING**- some of the niche crops are papaya, onions, potatoes, carrots, pitaya, peanuts and several other special items. The word niche does not mean small as I heard an estimate a few days ago that we export 20 million dollars worth of papaya. Niche crops are somewhat unfamiliar to most of us. There is a lot of room for expansion in organic crops, medicinal plants, herbs, flowering trees and some livestock. Oil palms seem to have a great future in Belize.

### U.S. AG. RESEARCH

The USDA and research companies have led U.S. seed producers to continually work on new and better seed germ plasm, including genetically modified organism products (GMO) The U.S. farmers planted 88% of their 95 million acres of corn in 2011 using GMO corn seed; 94% of all soy bean acreage is GMO and 90% of all cotton is GMO. Belize for some reason is unable to come up with a government policy that will lead to the importation of GMO seeds. Some farmers believe that by not having a GMO option it is costing approximately \$8,000,000 over 35,000 acres of corn. These losses are a result of reduced yield, lower quality and higher costs. Farmers mostly source their seeds from DeKalb or Pioneer dealers here in Belize. The U.S. Embassy and U.S. AID in the past years have always been willing to listen and support Belize Agriculture

**CATTLE**- Our Minister of Agriculture, the European Union, the Government of Mexico, IICA and Belize Livestock Producers Association have all signed on and agreed to a 12 million dollar sanitary/ health project. We hope to test every animal in Belize for tuberculosis and brucellosis. We also will put in two ear tag identifiers that will serve as passports for these animals. This is a necessary requirement in order to market cattle to Mexico and other places. I believe this to be the biggest thing that has ever happened in the livestock industry. “Ever”.

### MY FUTURE PROJECTIONS-

1. In five years –a 30% increase in cattle and prices will average \$1.50 per pound.
2. Corn – in five years a 30% increase in corn acreage and prices at 30 cents average
3. Bean acreage will increase along with corn and prices will be \$1.25 to \$1.60
4. Rice acreage will increase by 20% and farmers will learn to reduce costs and the price may stay the same or even lower a bit to be able to compete on the export market

### CLOSING

We are also very grateful to a very competent U.S. Embassy, Ambassador and staff for helping us with importation, exportation and their concern about terrorism, drugs and human trafficking. Thank you, Uncle Sam- I have dual citizenship and consider Belize my home but I still get cold seeds and goose bumps when I say or hear- “I pledge allegiance” – or “Oh say can you see by the dawn's early light.” I also get that feeling when I hear “O Land of the Free by the Carib Sea, Our manhood we pledge to thy liberty.” Thank you.

## Organic Production

### The Largest Farming Population of Belize...

*Continued from Page 1*

*By Greg Clark*

This is due to their process of taking leaves deep into the soil which break down and create compost within the soil.

I have been asked many times how to control the ants utilizing organic methods. Through experimentation, I have found out that the utilization of a garlic water spray on the trail masks the scent markers applied by the food-seeking workers. When the trail is sprayed, the consistent train of workers become lost without guidance. This method also works as a spray on the leaves or the base of a tree that is being attacked by the workers.

Another method is to apply a fungicide spray to the plant that is being cut. After the fungicide application, the cutting continues only for a short time. In that short time, the workers in the nest "report" the resulting fungal destruction and seek to stop all deliveries of the affected leaves. A suggested spray is from boiled jackass bitters or a copper sulfate spray blended with 2 tablespoons of liquid dish soap per 4 gal.

To attack the nest, the best method is to seek to destroy their ability to grow the fungi. Application of a fungicidal soak stops the growth of the fungi below ground. This requires quantities of a fungicide liquid to be poured onto the nest and flushed with water and a dish soap mixture to allow a deep penetration of the solution.

An important statement to make is that the ants are very smart and adaptive to a changing environment. They are particularly selective of the plant leaves that are collected for their use. If a leaf type of a variety is brought to the nest and creates an undesired result, that variety will not be utilized again. Creating an undesired result for the ants, with an application spray, educates the ants to steer clear of that specific species. With this concept, sacrificial plants can be utilized to occupy the ants and protect the species that have a greater value to humans.



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# BEYOND THE BACKYARD

## LITTLE PICKLE

By Jenny Wildman

It is joyous when a plant not only grows but grows faster than Jack's beans and bears edible fruits in astoundingly record time. Success! After eating this vegetable but once, lightly fried and accompanying a chicken masala curry, not even knowing its name, I launched into growing this



vine. It grows tiny gherkin-like cucumbers, best eaten when young, brilliant green and crispy. Either raw or cooked it is somewhat bland and improves with a bit of spicy attention. Cumin, yellow ginger, fenugreek, hing, tulasi, onions and garlic are formidable partners. A perennial herbaceous vine of the pumpkin family which prefers a sunny location and sandy soil, it can be started from cuttings or seed and is readily spread by birds and animals. It is attractive with pretty white flowers, yet invasive, rapidly taking over the light and stealing nutrients from other plants whilst hanging on to them to gain control. You may decide that it is the vine from hell, enveloping whole areas at amazing speed. However it is prolific and no one could ever go hungry with this little vine hanging around. I have tried it every which way and lovingly refer to it as my little pickle, a British term of endearment for a mischievous yet lovable child, full of spunk. I eat it raw whilst tending the garden, made some dill pickles from it and a deliciously rich chutney.

Its name is **Tindora** or Kundru , Kovai ,Tendli, Toruli, Coccinia Grandis, Pepino Cimarron or the Ivy Gourd and

more. Yet the name that intrigued me most is **Gentleman's Toes**. Short, stubby, soft, smooth-skinned cukes which turn from emerald green to pale yellow to scarlet red. Colonial privileged toes. Since this plant appears to have hailed from India one must assume that the name has much to do with this era of the British Raj, a long time occupation which taught many important international lessons and left streams of gentlemen returning to the motherland with diverse vocabularies and a taste for the aromatic spices of exotic lands, new fruits and strange vegetables, differing customs and beliefs. These gentlemen introduced health measures for plague control in India and, in turn, learned the simplicity of ayurvedic medicine. This little pickle may have helped many in times of dire distress.

"Mix thirty grams of juice made from Gentleman's Toes with fifty grams of curd. Drink at dawn for a full week. Avoid cold, salty, or sour foods and in 7 days the jaundice will be controlled." An excellent saviour for the liver. Research has great news for diabetics. Apparently this humble vegetable growing from this naughty invasive vine has been proven to dramatically lower blood sugar with a prescription of eating just 50 grams per day. You may also make juice from roots and tea from boiled leaves and it becomes a tonic for the immune system, a powerful antioxidant, a source of major vitamins A, B, C, and minerals plus a good source of dietary protein and fibre. It reduces fever and aids in curing any diseases of the blood. In some areas of India there is a superstition that the ripe red Tindora causes dementia. It is also said that they are bitter. Since other places happily eat the ripened fruit, which actually tastes quite sweet this is yet another misconception. It is hard to pick the ripe fruit though without squashing and always best to pick fresh young toes as they do not last long, even in the fridge. If you have family members which may benefit from the suggested uses of this vegetable you may wish to consider it a backyard food item. Happy to give you a cutting. As always take care, have fun growing and send any information you would like to share to

Jenny Wildman

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## BEEKEEPING AND INTEGRATED FARMING SYSTEMS IN THE VACA FOREST RESERVE

A **forest reserve** is a protected area that provides for multiple use practices. These practices are primarily extractive in nature such as logging, non-timber forest harvest including *xate*, bayleaf and orchids. Given the increase in human population pressures upon the resources on these protected areas, there is a need for identifying means to sustain the ecological processes yet provide for human utilization and management. This is true for the **Vaca Forest Reserve** and other multiple use reserves across the Chiquibul-Maya Mountain Massif. The Vaca Forest Reserve has been described as the most threatened protected area due to multiple interests in the area ranging from logging and farming to tourism and hydroelectric schemes. The problem is further aggravated by logging concessions that lack sustainable long term plans. But hope is there. Six months ago, a new way of using and managing the Vaca Forest Reserve began with the endorsement of the Forest Department.

Friends for Conservation and Development (FCD), a leading environmental organization, took the initiative of partnering with the Forest Department and Agriculture Department in finding an alternative for the protection of the Vaca Forest Reserve.



With financial support from the United Nations Development Programme and the Global Environmental Facility/Small Grants Program the development of a landscape management strategy was developed and a pilot bee-keeping initiative was launched. Fifteen farmers impacting the reserve were selected. These persons, including 13 men and 2 women, received overall suits, veils, hats, gloves, smokers, tools, beehives and training. More importantly to operate within the context of the Forest Act, the Forest Department signed a concession agreement with the Cayo Honey Quality Producers Cooperative Limited. This concession provides the 15 beekeepers to operate their beehives in an area of 5,000 acres inside the reserve.

Presently farmers have increased the number of hives and have started to extract honey. With a revolving fund created at FCD to help the bee-keeping cooperative purchase the honey from farmers, a market is being secured for the farmers.



The second initiative includes the launching of an integrated farming system (IFS). It is expected that this system will follow the guidelines provided in the landscape management strategy being prepared by CATIE. As part of the IFS, three training sessions have been held on farm planning. These have resulted in the development of a plan on how farmers would like their farms to be in the future.

FCD's extension technician and CATIE/MESOTERRA's agronomist have assisted farmers in preparing their plans. Weekly field visits and guidance is being provided to the farmers in the Vaca.

Ultimately, the anticipated results of this effort with farmers in the Vaca Forest Reserve is to build a long term stewardship for the ongoing protection of the forest reserve, and to reduce land degradation in the short and medium term.



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## Banana Bank Corn Loss from Tropical Storm Harvey August 20th, 2011

Estimated	Field		100#	Per Cent	Loss per	Total
Age-Days	#	Acres	Bags lost	Damage	Acre- lbs	Loss- \$\$\$
65-70	1	120	1350	25%	1125	40,500
65-70	2	60	675	25%	1125	20,250
30-40	3	60		0		
80-85	4	65	3380	80%	5250	101,400
70-75	5	45	495	20%	1100	14,850
30-40	6	50	250	10%	150	7,500
75-80	7	50	2925	90%	5850	87,750
60-65	8	60	900	25%	1500	27,000
65-70	9	60	1155	35%	1925	34,650
75-80	10	100	6000	80%	6000	180,000
70-75	11	120	2640	40%	2200	79,200
75-80	12	160	6160	70%	3850	184,800
70-75	13	65	1430	40%	2200	49,200
60-70	14	110	2227	55%	2025	66,825
		1125	29,587			893,925

### General Statistics

1125 Acres in farm calculation

528 Acres suffered various percent of storm damage

29,587 100 # bags destroyed (at 30.21 per bag)

893,925 calculated loss

#### Comments:

The corn that suffered the worst was the older 65 to 85 day corn- green eating stage. The weight at the top with the wind forced the stalks flat. They went down like dominos. Younger corn 5 feet and less suffered less and will have some recovery.

Sometimes the damage was minimal or none- 1/2 to 1 mile away- in other words-Harvey's path was very defined.

The rain made the root/soil connection very loose and the stalks went over easy- they seldom broke- we have some, but very little hope that older horizontal corn will rise to a productive state- winds seemed @ 35 to 45 mph with some higher gusts- there was definite evidence of cyclone wind damage. These are newer and hopefully better calculated estimates than from August 22, 2011

These are estimates only from John Carr.

August 24th, 2011

## Strengthening the Belize Citrus Nursery Industry Citrus Growers Association (CGA) Citrus Research and Education Institute (CREI)



Presently agricultural industries face many challenges, from fluctuating world prices, high cost of production, low productivity and to cap it off, diseases. The Belize citrus industry is no exception and quite recently in 2009 the very devastating citrus disease HLB or citrus greening was found in Belize.

HLB is associated with the bacteria, *Candidatus Liberibacter spp.* and is spread by a Psyllid vector, *Diaphorina citri*.

In citrus, most scientists and growers worldwide agree that one major indispensable management strategy to combat and manage many of the most devastating diseases is the use of clean, disease-free citrus plants grown under screen and passed through the process of a sound citrus certification program. In 1995 the Citrus Growers Association (CGA) through its Citrus Research and Education Institute (CREI) established the Belize Citrus Certification Program (BCCP). Many aspects of the BCCP were modeled after the California Citrus Certification Program which along with Spain's is one the most advanced certification programs in the world. Some aspects of the BCCP were modified to suit Belize's subtropical conditions, while still maintaining a high standard for citrus nursery production. In CARICOM and Central America, Belize has the longest established citrus certification program. In 2000 the BCCP was incorporated into law and has since been managed by the CREI of the CGA.

The recent (2009) discovery of Huanglongbing (HLB or formerly citrus greening) disease has created many changes to the BCCP and to other aspects of citrus management in Belize. All changes to this citrus nursery production system are reflected under Statutory Instrument (SI) 122 of 2009. The changes to the program, such as growing plants under screen, were effected based on solid recommendations from the National HLB Task Force, appointed by the Minister of Agriculture, and tasked with steering the management of the disease. Major recommendations laid out by the HLB Task Force include: (i) Managing the Psyllid vector population (ii) Use of disease-free certified nursery plants produced in screened structures and (iii) Managing HLB inoculum levels within the grove, depending on the level of infection. All three are to be adopted done in conjunction with a good nutrition program.

One of the major changes in the citrus nursery industry came about when citrus nursery plants grown in the open were compromised by the HLB disease. After two years of not having any certified plants in the industry, today the demand for citrus nursery plants is substantially higher. To date, four screenhouses have been constructed and are well on their way to qualifying for certification status, which will be granted provided that they fully meet the requirements of the BCCP. Availability of certified citrus plants for the industry and public in general will be for the next planting season starting in May/June 2012. Remember, when buying citrus plants; ensure that they come from a certified nursery.

For further information on availability of plants, please don't hesitate to contact us at 522-3535 ext. 235 or 244.



## REGIONAL PINK HIBISCUS MEALYBUG PROJECT (PHMB)

The Regional Pink Hibiscus Mealybug Project operates in collaboration with the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA), Belize Agricultural Health Authority (BAHA) and the Ministry of Agriculture, for the control of the Pink Hibiscus Mealybug, *Maconellicoccus hirsutus* (Green), which is an alarming economic threat for the agriculture, forestry and tourism industry. The PHMB is known to be an important pest due to its wide range of host plants and its severity in damage to more than 200 genera plants in more than 70 different families.

After its first detection in 1999 in the Belama Fase 1, Belize district, the dissemination of the pest has been hastily attacking plants of the Malvacea family (hibiscus) causing severe deformation, hence destroying its host completely. At its discovery, the Ministry of Agriculture in collaboration with other Regional Organizations (CARDI, USDA, IICA, OIRSA) took action in the control of this PHMB, having under quarantine the positive infested areas until the full status of the pest was known, and hence the development of a control program to be implemented. At the inception of the biological control programme of PHMB in the year 2000, *Cryptolaemus monstruozi* (a non-specific predator beetle) were imported to drastically bring down the population of PHMB. Then, *Anagyrus kamali* a known specific biological agent for the control of *Maconellicoccus hirsutus* (Green) was introduced to further control PHMB. This parasitic wasp was introduced from CABI International, Puerto Rico in 2000 for the initiation of a regional reproductive program financed by OIRSA. Furthermore, a residential house was furnished to serve as a temporary insectary to reproduce the parasitic wasps up to 2003 when OIRSA fully constructed an insectary with the required specification for the reproduction of this biological agent for the control of PHMB.



With this new facility thousands of parasitoids were produced and released in the entire infested areas in Belize and in the year 2004/05 a number of parasitoids were exported for the control of the PHMB after its discovery in Valle de Banderas, in the State of Nayarit, Mexico under the regional control program of OIRSA's member countries.



Since 2000 OIRSA has taken the lead for the control of this pest and is covering all the cost incurred from salaries, maintenance of the laboratory and surveillance plan. This control plan is costing OIRSA member countries an average of US\$100,000 per year. It is like an insurance plan; they pay us to control it here in Belize and avoid its entrance into other OIRSA member countries. This program has proven to be effective in maintaining the pest under control causing no negative effects to the environment or to humans. This pest has not reached any agricultural-related farm as to affect production or commercialization of the product.

OIRSA is presently studying the possibility to eradicate this pest or lower the population of the bug to a significant level in a pilot area under our conditions.

The Regional Pink Hibiscus Mealybug laboratory has been effective since its inauguration in 2003, producing thousands of *Anagyrus kamali*. In the year 2010, a total of 313,543 parasitoids were produced from which 80% were released and the other 20% were used for reproduction purposes. For the year 2011, significant increase in the production of the biological agents continues to be realized.



Geographical Distribution of PHMB in Belize, 2010.



A. Kamali Produced in PHMB Laboratory 2010.

For more information on the PHMB please contact OIRSA office at telefax: **822-3753** or **822-0521**. Our e-mail address is [oirsaphmb@btl.net](mailto:oirsaphmb@btl.net)

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## Grow Your Own Heirloom Seeds

**Dr Mandy Tsang, MBChB, DRCOG**

When we first arrived in Belize, one of the first crops we wanted to plant was corn and we found that we had two choices for seed. The first was the kernels purchased from the Mayans from their milpa plantations; the quality of the seeds was quite inconsistent, ranging from small to medium size with a high number of misshapen or shrivelled up kernels. The second choice was the hybrid seeds available from the Mennonite store which, in comparison to the Mayan corn, when examined, were large, well-formed and pleasing to the eye. Now, one of the main reasons we took up farming was to live our philosophy: we want to eat good wholesome food without dependence upon an outside source. The hybrid seeds certainly defeated this purpose as it would mean buying seeds each time we needed to start a corn crop to ensure a high standard and yield of corn. We were then faced with the challenges of growing "unimproved" Mayan corn and here is where we would like to share with you a system of seed selection which helps improve quality, size and yield of crop, year after year. An additional advantage of this selection procedure is that you will eventually grow a crop which has adapted perfectly to the soil, environment and climate of your own particular farm. Although in this article corn has been used as the crop, there is no reason why you cannot apply the same principles to any other crops on your farm. With due attention, a new "strain" or "variety" can arise and these "heirloom seeds" ensure that you will never need to rely on outside sources of seeds and put up with the can of worms which this implies in our modern world.

### System for Improving Seed:

- 1) Pick 50-100 of the best ears from your corn crib or field. They should be of good form and size, well-filled and well-rounded at both ends and pleasing to the eye and hand.
- 2) Examine each cob individually under good light and keep discarding ears until only the best 10 remain.
- 3) Before shelling the grain, pick 10-20 kernels from various parts of each cob, avoiding the two ends. Keep each group of kernels from each cob separate and perform a critical germination test (see below) to observe which has the highest germination rate and grows the quickest and sturdiest.
- 4) The best cobs, as determined by the germination tests, are then chosen for growing on to "test rows." The seeds from each ear should be grown in their own row.
- 5) As plants grow, examine the rows to determine which rows:
  - a. Produce the sturdiest plants.
  - b. Produce the most multiple-ear plants and the smallest proportion of stalks with only leaves.
  - c. Cut down the individual plants from each row which are undesirable. Destroy all diseased plants.
- 6) At harvest time cut and cure all the stalks with the largest number of ears from the **best** row. The best row should exhibit the criteria that you have chosen (in this case, multiple ear plants, highest germination rate and large, sturdy plants).

- 7) With the cobs from the best row, repeat the same procedure (1-6). Collect the remaining multiple ear stalks from the other rows and use the grain from these ears for general planting. Do not use any remaining stalks for planting.

### The Critical Germination Test:

- 1) Count out the number of seeds in each batch (eg. 25).
- 2) Germinate each batch separately between two sheets of blotting paper kept moist in a warm room.
- 3) Every day, record how many seeds sprout and how strong they appear. Remove sprouted seeds and discard. Rapidity and uniformity of sprouting indicate strength. Slowness and irregularity of sprouting indicate weakness. Weakness suggests that plants may not grow on open ground.
- 4) Select the best batches for planting under the system for improving seed.

The germination test also helps to develop uniformity of maturation times for plants which allows harvesting at the same time.

With this selection procedure, you should start seeing noticeable improvements in your crop after 5-6 generations. If you plant corn twice per year, you will start seeing improvements by the beginning of the third year of planting. You can speed up the selection procedure by planting corn four times per year and you will start getting better seed by the beginning of the second year. If you are growing corn mainly for personal consumption, then I would encourage you to take the time to "tweak" your seed to perfection and use the system as a leisurely contemplation into nature and genetics.

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# THE OYSTER MUSHROOMS

**Dr Alessandro Mascia, BMBS, CHed**

A big “thank you” to all the readers of the AgReport who have come back with feedback and comments regarding this column on mushrooms. Taking this feedback into account, I would like to change tack this issue and forget about Mayan mushrooms (I promise we will come back to them) for a while and move onto and describe some mushrooms which are eminently edible and fortuitously fruiting at this time of the year.



So, let us talk briefly on: *Pleorotus ostreatus* or the Oyster Mushroom. Most people have heard of and many have sampled commercial oyster mushrooms before, while true fungophiles have, of course, found and picked their own. Let me encourage you then to start looking around; I have located, collected, cooked and devoured about five pounds of oyster mushrooms in the past month after the habitual cycle of 2 to 3 day Toledo rains followed by 2 to 3 days of sunshine. Depending on the exact length of the rain and sunshine periods, different flushes of oyster mushrooms are stimulated to fruit. The oyster mushroom is adaptable to fruit on a variety of substrates but in its natural habitat it tends to be found on logs or pieces of wood. The patches I have found have been on golden plum, craboo and moho logs or fallen branches; it also seems to like coming up on dried coconuts that have subsequently become wet with rains and the stumps of dead coconut palms.

This time around, I shall desist from typing out an “official scientific” description as I have to grudgingly admit that only a fungophile or scientist would appreciate the neurotic exactness of such a description. Most people have heard of oyster mushrooms and I think that a picture will give the average reader more information than any number of words (apologies to David Arora: photos are without his permission from Mushrooms Demystified). Having said this, I think that it is always worthwhile taking a spore print of any mushroom that is collected; after all, confirming that the spore print of the “oyster” mushroom you have picked is white is reassuring and is one of the essential steps in definitive identification. (All the spore prints of oyster mushrooms I have found in Belize are white; the identification guides say: white to pale lilac or lilac-gray.) In terms of edibility, they are delicious: breaded and fried, stir fried in little slices, sautéed in butter, *et cetera, et cetera*...the flavour is reminiscent of sea-food.

Many of you may find the medical properties of oyster mushrooms interesting: studies have shown that *Pleorotus*



*ostreatus* and other closely related species naturally produce Lovastatin, which is a drug approved for the treatment of excessive blood cholesterol. Oyster mushrooms have also been shown to have tumour inhibiting effects in animal control models (write me if you want the references); whether this translates into a useful effect in human treatment is, as of yet, unclear but it doesn’t sound like eating oyster mushrooms on a regular basis would be a bad thing!!

Go forth and spread the spores!

*Dr. Alessandro Mascia is a practicing medical doctor with his wife, Dr. Mandy Tsang. They have a farm in Toledo where they specialize in growing coconuts and guinea pig husbandry. They make coconut oil soap, copal oil and other medicinal and beauty products.*

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

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

<b>Belize Cattle</b>		T	A	B	<b>Grains, Beans &amp; Rice</b>		T	A	B
Young str. & bulls- 750- 1100 lbs	H	1.15 -1.25	1.10 - 1.15		Belize yellow corn	H	.39 - .41	.37 - .39	
Cows & Heifers for Butcher	H	.90 - 1.00 (thin)	.80 - .90		White Corn	H	.44 - .46	.43 - .44	
Heifers for breeding 500-800 lbs	H	1.30 - 1.35	1.20 - 1.30		Corn/ Local retail (Low volume)	H	.45 - .50	.43 - .45	
Young grass cattle- 350- 650 lbs	H	1.25 - 1.35	1.15 - 1.25		U.S. corn @ 7.60-per 56 lb bushel	H	\$27. 50/ BZ 100#-12¢ ft. to BZ		
U.S. price -corn fed- 1000- 1200 lbs	H	1.10-US=2.20-Bz			Guatemala corn price/Peten	H	.45 - .55	.43 - .45	
U.S. price - feeders 600- 800 lbs	H	1.30-US=2.60-Bz			Belize Milo	H	.33 - .35	.31- .33	
U.S. price- calves 450- 600 lbs	H	1.40-US=2.80-Bz			R-K's, little reds & blacks (beans)	H	1.40-1.60 farm price		
U.S. price- aged butcher cows	H	.85-US=1.70-Bz			Black eyed peas	H	.85- .90 farm price		
<b>Belize Hogs</b>					Milled retail rice per pound	S	.88- .94 farm price		
Weiner pigs- 25 -30 lbs- by the head	S	\$95.00 - \$100.00			<b>Citrus</b>				
Butcher pigs 160 - 230 lbs	S	1.80 - 1.85	1.70 - 1.80		Oranges per 90 lb box-lb.solid basis	H	\$12.50 Est. 2011 price		
<b>Belize Sheep</b>					Grapefruit- per 90 lb box	S	\$ 6.00 Est. 2011 price		
Butcher lambs	S	2.00 - 2.50	1.75- 2.00		<b>Sugar</b>				
Mature ewes	S	1.70 - 1.75	1.60 - 1.70		Cane per ton- est. 2011 price	H	\$65. 00 (130 was an error)		
<b>Belize Chickens</b>					White Sugar- 112 lbs- controlled	S	\$45/ bag + 3-5 cent mark up		
Broilers- live per lb	H	1.21 - 1.23	1.19 - 1.21		Brown Sugar- 112 lbs- controlled	S	\$39/ bag + 3-5 cent mark up		
Spent hens	S	.75 - .76	.73 - .75		<b>Fruits &amp; Vegetables</b>				
<b>Special farm items</b>					Tomatoes, cabbages, cucumbers	S	whsl/ .75-1.75; ret-\$1.00-\$2.50		
Eggs-tray of 30 eggs	H	5.75 farm- retail	.25 per egg		Banana- retail	S	8 for \$1.00		

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

**Dear Ag Readers:** "Wow" For the first time in a long time, cattle have seen a 25 cent increase on a 1,000 lb. #1 quality steer/bull. This amounts to \$25! per head more. This will cause grass plantings to increase, buying better bulls and an expansion in the national cattle herd. This increase is because of cattle exports. Our neighbors have shortages and are seeking us out- TG- Please note the U.S. price compared to ours- \$1.25 /lb. to \$2.60 BZ per lb. Northern Guatemala and Middle Mexico are "probably" getting \$1.75 per lb. Corn is also at a high price because of shortages, bad weather and exports. High prices cause leaders to want to stop exports and or put on price controls- both will stifle expansion. I heard a speaker say "If we put price controls on agriculture, maybe we should put price controls on hotel rooms (ex. Nothing above \$75). We want to expand agriculture, promote jobs and bring home foreign exchange. Prices will level out and come down at harvest time. Agriculture has risk (Harvey) and farmers are facing higher inputs on nearly every crop. Thanks to the Ministry of Agriculture, BAHA and others for moving forward on the Cattle Sweep. I see it as the most important cattle event in my life. Cattle producers- Stake holders-Let us all jump on this train- God Bless- John Carr

## LIGHT REIN

By Marjie Olson

### 2nd Annual Triple Crown Endurance Race

October 1st - 20 miles ♦ November 5<sup>th</sup> - 25 miles  
December 10<sup>th</sup> - 30 miles

(Dates will be subject to hurricane/severe weather both during and before a race as we want the events and trails to be safe for all competitors.)

Races will be held at the Belize Equestrian Academy (BEA) 53.5 Mile, Cayo. Trails are natural terrain and although well groomed, Mother Nature may add her touch at any time during the race; be aware there will be hills, mud, rocks and low branches and vines.

For first time entries, Light Rein Farm (LRF) and BEA will do their best to assist you in having a safe race as we have done in the past for other first time entries.

**Lower Entry Fees** this year: now \$150.00 per horse and rider team per race. You may earn free entries by getting sponsors for the TCER. Each \$500.00 sponsor you bring to us, we give you \$100 off of one entry. Get a total of \$2000 in sponsors and we give you all three race entries, a value of \$450.00 for you and great advertising for your sponsors.

**Rules:** 5 mile laps will be run with a vet check after each 5 miles. Competitor will be released back into the race once horse parameters have been met. (Horse heart rate needs to be at 70 bpm to meet criteria as well as soundness, respiration and over all health.) Any horse not making the parameters within 30 minutes will be disqualified and not allowed to continue. Any vet expenses incurred will be responsibility of the entry.

Horse age must be at least 4 yrs.; horse shoes are optional but recommended. Saddle and bridle are required. Helmets are mandatory for any one under the age of 18 and strongly recommended for all riders. Riders under the age of 18 must have a signed legal guardian waiver; you may pick up waiver before race.

70% of all entry fees will be paid back. New payout will go as follows: Each "First In" per lap will receive \$25.00 as long as parameters are met before the 30 minute cut off. Each "Quickest Time Out" will be paid \$25.00. And final placing payout for each race will be 1st, 2nd and 3rd.

Although "First Ins" and "First Outs" are strategically helpful in keeping you and your horse out in front of the competition and can earn you extra dollars, it still comes down to the final lap and who crosses the finish line first. But remember, you will still have to pass a final Vet evaluation and have parameters met within 1 hour of the finish line crossing. Again, common sense and safety

should be first priority over the win.

Points will be accumulated through all three races and there will be **three champions** awarded December 10<sup>th</sup>: **Champion Rider, Champion Horse and Champion Team**. This means a rider does not have to be on the same horse for all three events, nor does a horse have to have the same rider for all three events; but *each rider and horse will have to have been entered in all three races and the champion team must have been the same team all three*. This means one team could win all three championships, or we could have several different champions. Each champion is guaranteed an additional \$500.00 with the hopes of more added monies being distributed. A minimum guarantee of \$1,500.00 will be paid to final champions at \$500.00 each.

All entries will receive a gift bag for their first entry which will include a string back pack and a TCER T-shirt as well as goodies and products. All entries who complete the race will receive an award as well.

You may bring your horse for practice rides free of charge once entry for race 1 has been paid, or at the charge of \$10 per horse per day, but trails will not be marked with specific outline until the week before and no horses will be allowed on trail 2 days before the event.

Stalls will be available the night before the races for those hauling in a long distance. Please reserve ahead of time so we may have it prepped and ready and tell us if feed is needed. If you require cut grass, please bring your own; otherwise hay and a mill feed-corn mix will be available.

Final rules will be available on line or in print and available at the BEA 2 weeks before the race and in your entry packet at the TCER.

*Continued on Page 17*



Marjie Olson has brought

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Yes it's Belize....But that doesn't mean you can't advance you and your horse.

Email: Shotzy08@live.com or 663-4609, please be aware , email and phone services are limited at this time, it could be a day or two to get back with you



**Light Rein, Continued from Page 16**

**Please Note:** Ice will be available with a pre-order for \$2.00 bag; or \$3.00 a bag on day of race. Please bring your own buckets and sponges and ice coolers as you feel necessary.

**Preparation For the Race:** Good pre-conditioning and common sense are your best tools for doing well at the TCER. Any breed of horse can do this event, but those with decent feet, good wind and strong hearts will do the best. You should not compete if you or your horse are not at a health level that is conducive to riding the distance, taking in the consideration of hills and heat.

Keep in mind that you need to build up your horse's stamina as you train. You can not expect a horse who has been in the field for months to come out and run a 20 mile course... But if you start conditioning now and continue through each week and through each race, 3-4 rides a week, as the races continue, so should your horse's abilities and your chances of doing better each race goes up significantly.

There are 5 weeks in between races which allows for an increase in conditioning. You can enter the first race with ambition to finish and come back for races two and three and blow the game wide open! Don't think you can't do this...**you can!** This is an event for all breeds and for all levels of riders. Remember you do not have to win each race to win the championship! Points add up and consistency can often outdo a single win.

**Disclaimer:** Now for the serious part: Belize Equestrian Academy, Light Rein Farm and any and all of its affiliates, owners, workers, sponsors or volunteers, will in no way be held

*Continued on Page 19*



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# NONI

By Karin Westdyk

It is believed that Noni (*Morinda citrifolia*) originated in Southeast Asia and was used throughout the Pacific Islands for food and medicine as far back as 2000 years ago. In the 1700's, during his travels to Tahiti, Captain James Cook wrote



about the use of noni fruit as food and noted that the roots and bark were used to produce a yellow or red dye. But, most importantly, noni has been traditionally used as a medicine to treat a variety of ailments.

Included in the traditional South Pacific and Asian pharmacopoeias, noni was recorded as a key ingredient in many medicinal formulas. Virtually every part of the plant was used. Leaves were used as a bandage or poultice for healing wounds, as well as for treating coughs, TB, high blood pressure, stomach problems, diabetes, vitamin deficiencies, and to stimulate appetite. The fruit was used to alleviate lower back pain, and to treat everything from asthma, to head lice, and including broken bones, sore throat, and toothaches. Other maladies traditionally treated with noni were fevers, skin diseases, abscesses, constipation, eye conditions, respiratory problems, gastrointestinal, menstrual and urinary problems, as well as venereal diseases, and the extracted juice from the unripe crushed green fruit was used as a remedy for sores in the mouth.

In the last several years noni has become popular around the world. It is sold and often touted as one of the most versatile alternative herbal medicines. Though many are "put off" by the smell and taste of noni, it has been successfully used to treat hyperactivity, addictions, allergies, arthritis, asthma, brain disorders, burns, and cardiovascular disease and is currently being researched as a treatment for some cancers. Noni continues to be valued as a medicine for those suffering from diabetes, digestive problems, hypertension, immune deficiencies, infections and inflammations, and is also being used in veterinary medicine.

Noni trees can be started from seed, or they can be propagated by means of stem cuttings. Growing noni from seed is the preferred way because a seed builds a stronger tree. However, propagating from seed can take from 6-12 months or more before any leaves appear on the plant, while it takes only 1-2 months for noni to be sprouting new leaves through the stem cutting method. On average, one fruit of the noni tree contains approximately one hundred seeds.

To plant from seed, it is best to take a very ripe fruit and separate the seed by thoroughly washing away the soft flesh of the fruit. Though the seed can be planted with the flesh attached, it takes longer for the seed to germinate. Nicking or scarifying the seed speeds up germination time.

Noni seeds can be planted directly into the soil, or in tall growing bags or deep pots, where they will have room to develop a longer taproot over 9 -12 months, before being

transplanted into the soil. Noni seeds grow best in hot wet conditions, so they need to be watered regularly, or planted during the rainy season.

To avoid root rot disease, caused by parasitic worms, some nurseries prefer to start seeds in a sterile medium, but treating the soil and the plant with neem should go far in avoiding any parasitic problems.

If the stem cutting method is used for propagation, choose a healthy plant and remove a branch. If a good amount of sap is evident where the cutting was removed, there is a better chance that the cutting will be successful. Plant the stem into a clean growth medium and give partial shade, watering regularly. Once rooted, noni is best planted in a sunny spot 10-12 feet apart. Reaching maturity in about 18 months, it can yield up to 18 pounds of fruit per month throughout the year and can grow up to 30 feet in height.

Though the smell is rather unappetizing and the taste is bitter, it has been used as food in times of famine and in some places as a staple where it is salted and eaten raw or cooked and prepared with curry. The seeds are also edible when roasted. Many animal feeds are now enhanced with noni and we have found that our chickens savor very ripe softened noni fruit.

Noni juice can be easily prepared by allowing the ripened fruit to simply sit in a clean glass jar, preferably in the sun, where the juice will seep out of the fruit over several weeks. A video on how to make noni juice can be viewed on the internet at [http://www.metacafe.com/watch/1288432/how\\_to\\_make\\_noni\\_juice/](http://www.metacafe.com/watch/1288432/how_to_make_noni_juice/).

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**Light Rein, Continued from Page 17**

responsible for any accident, injury, damage or loss of value to any person, animal or thing. All riders ride at their own risk and owners who have an entry with a rider other than themselves enter horses at their own risk.

We try to make the TCER a family day for everyone and plans are to have our face painting and balloon art again for the kids, horse rides for the little ones and of course our ever popular *TCER Open Horse Show* following the endurance race.

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## Organic Horticulture in Belize with Brazilian Assistance

By Fay Garnett

### Agricultural Officer MAFC Central Farm

In May of this year, the Brazilian Embassy collaborated efforts with the Ministry of Agriculture, Fisheries and Cooperatives (MAFC) in strengthening technical capacity for tropical organic horticulture. As a result, a two-week technical training was provided through the Brazilian Agriculture Research Cooperation (EMBRAPA). The participants of the training were from seven CARICOM countries including Belize, Dominica, St. Lucia, St. Kitts and Nevis, Grenada, Barbados and Suriname.

The training involved various technical presentations and field visits to organic producing and family farms, farmers markets and scientific research stations. The specific focus areas were organic crop production techniques, crop nutrition, pest management, green manure, field design, organic farmer associations, cooperatives and certification. It is clear that the technologies that the Brazilian farmers are currently using are towards promoting environmental preservation, low cost production and practicality in the fields. Of course, these are some key areas in which any farmer, whether organic or conventional, should be focusing.

Considering the numerous challenges involved in organic crop production, farmers in Belize must consider some practical alternatives that will reduce organic production cost, enhance crop quality and protect the environment in which they grow and operate. The knowledge gained from the training once transferred to the farmers will allow farmers to analyze and determine what the benefits of organic agriculture can bring to the nation. This will mean sustainable farming techniques, healthy foods and income generation. EMBRAPA scientists have expressed their willingness and interest in assisting the MAFC with technical information and expertise through their research activities that are undoubtedly relevant and applicable to our Belizean conditions.

With regards to the adaptability of the skills and knowledge provided through the training and assistance, they will definitely be an asset to our farmers. Just recently an alliance was formed by three farmer groups and cooperatives in the Cayo district. These groups have developed a Participatory Guarantee System (PGS) and they are interested in applying some of the lessons learned in Brazil as it relates to soil nutrition, production, marketing, certification and the environment among others. After the training, a workshop was conducted with the farmers on related topics and they are anxious and determined to strengthen the organic work they are involved in.

The MAFC is grateful for the cooperation that the Brazilian embassy has provided and we hope that it will not be a last of its kind.

### To the Editor, Continued from page 4

The heat can be used to give your shower water a decent Temperature. A third plus-point is that it will help the panels reduce sun-heating of the roof even more, thus helping to cool down the interior of the house. Another suggestion, where PV panels are not used, is to use the heat from the roof to power a heat engine like the Stirling motor, which directly powers a water pump, lifting water from the often-used large water tank to a holding tank placed above ceiling level to get enough pressure for a shower and/or flush toilet. That same heat (waste from the Stirling motor) can be used to heat water for your shower, kitchen sink, etc....

The above-mentioned alternatives also use the heat where it is produced; it's not transported elsewhere, thus reducing the effect on the global climate. They also use minimal technology, minimal resources (except those PV panels & ancillary devices), and cost far less. Efficiency of these alternatives is of less importance; the heat does not go elsewhere. Another good side is that less high-tech devices are used, thus need not be produced, thus influence the environment less.

The main point is this: let's use LESS energy. In the OVERALL sense. In other words, DO use solar energy, but try to harness it using LESS high-tech stuff. Take a small step back. AC? Yes, it feels nice while you're in such a space. But step outside, and you get slapped by the heat, start sweating profusely, and generally feel unhappy. And to pay for the AC-use, you have to work harder, spend more for food to power yourself for that extra work, thus need to work even more, and have less time to enjoy life. And you never get used to the environment, so you will keep getting that slap from the heat here in Belize.... Cooling the house via natural methods will indeed never get it as cool as with AC. But you get a chance to become more acclimatized, you can work less, eat less, have more time to enjoy life more, etc.... I call this a win-win mindset.

Regards,  
Scott  
<FSOphof@IntouchMI.com>

**Do you have some knowledge or opinion that you would like to have printed in The Belize Ag Report? We welcome contributed articles, as well as letters to the editor and ideas for articles. Your contributions will improve the paper. Kindly send to <editor@belizeagreport.com> or call Beth at 663-6777. Thank you.**

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## BEL-CAR Continues Expansion

By D. Feucht and B. Roberson

### BEL-CAR's First Corn Yield Competition



BEL-CAR's Paul Penner and  
winner Randy Friesen

A year ago BEL-CAR had a grand opening to demonstrate their new equipment for processing corn into grits and cornmeal. We recently visited them again to get an update on their production. CEO Otto Friesen reported that since last year they have expanded and installed new equipment from Turkey, a new sifter, another rotomill for the corn and a destoner for bean processing. As a result of using the new equipment their quantity and

quality have increased. For example, the equipment that was demonstrated last year used a belt to transport the corn from one processing station to another. The number of kernels that clung to the belt and dropped to the floor resulted in considerable waste. The new equipment uses a vacuum for transport, eliminating waste and increasing cleanliness. The equipment also increased the quality by retrieving more of the nutrients from the hull/cap by-product. (However, this benefit for BEL-CAR resulted in a decrease in nutrient level of the hull/cap byproduct sold for animal feed.)

Corn is used by the feed mills and farmers for feeding mainly poultry (broilers and layers) with a lesser amount for dairy cattle and pigs. Spanish Lookout consumes approximately 4 million pounds per month (100,000lbs/day) BEL-CAR's corn expert, Paul Penner, estimates that 120 million pounds of corn will be grown countrywide in 2011, exceeding the 90 million pounds in 2010. Spanish Lookout consumption alone will be approximately 50 million pounds and 30 million in the rest of Belize.

Last year BEL-CAR projected processing 18 million pounds of corn into corn meal annually to ship to their CARICOM customers, primarily in Jamaica. Their actual figures exceeded that projection; they processed 20 million pounds. They are now shipping more than 5 containers of 50,000 lbs each per week. Unlike the Guatemalan market, (which fluctuates according to the price Guatemalans can buy corn from the US. Note: BEL-CAR alone sold 14M lbs of whole corn to Guatemala in past year.), the Jamaican corn meal market is a steady one. Also, the Jamaicans appreciate the high quality of the corn products from Belize. Of the US grades of corn, usually only grades #3 and #4 are exported from the US. North American corn processed for corn meal would yield substantially less. By contrast, 100 lbs of Spanish Lookout corn at BEL-CAR yields approximately 65 lbs of high quality cornmeal.

In 2010 approximately 16,000 acres of corn were planted by Spanish Lookout farmers; in 2011 that increased to 20,000. Noted though, is that the majority of the increase is not on what the Mennonites consider 'fertile' land. Midwest Steel, the primary source in Belize for corn seed, sold 60% more seed this year than last but some farmers had to replant due to the weather. Farmers with black soil planted in April-May, (May 20 is our usual first rain date), in hopes for jumpstart with the first rains. However this year much of that early planting rotted and had to be replanted, adding approximately 25% to costs.

Production costs are up in 2011 because of adverse weather conditions. By early August some farmers in Blue Creek had still not planted the corn that is normally harvested September

through November; if a bean crop was planned to follow the corn, they had to decide to either do corn and skip the beans or skip the corn crop.

BAR inquired about the corn shortage reported by the media in July. It appears that the only shortage was in northern Belize, mainly in Orange Walk District. The shortage was caused by heavy exports (mainly to Guatemala) from that region. For the tortilla market, when the preferred white corn is not available, BEL-CAR can double clean their yellow corn as a substitute. The cost of that double cleaning adds about \$.05/lb to the cost, then transport to O.W. another \$.05, reaching \$.50/lb landed there. Since the white corn is lower yield/acre, the price is normally \$.10/lb more. Only certain varieties of corn make good corn meal; the yellow high carotene varieties are preferred. The current price for (yellow) corn is approximately \$.40/lb. Moisture content is also important for corn quality; 13.5% moisture content brings the best price.

BEL-CAR also increased their production and shipment of RK beans. Belize is the only country exporting kidney beans to other Caribbean countries. If Belize anticipates that she will run short for CARICOM customers, CARICOM must be notified, so that the process of waivers/permits can begin. Belize has already notified CARICOM that Belize is on the verge of running out of export RK beans from the current crop. The crop year for beans runs normally from February to January of the following year. For black eye peas, for which Belize is the 4<sup>th</sup> largest exporter, BEL-CAR ships 2 – 3 containers per week in average throughout the year. Approx 2% is consumed in country, and about 50% sold to CARICOM countries, the remaining portion of black eye peas is shipped to Portugal, the Middle East/Turkey, Canada and the US. At midyear, of the 6.3 M lbs of black eye peas harvested, approx 3M lbs remain.



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**Leucaena leucocephala**

*By Maruja Vargas*



Common names: Acacia, mimosa, wild tamarind among others.

This fabulous tree occurs naturally in the Yucatan Peninsula and the Isthmus of Tehuantepec in southern Mexico, and is widely naturalized throughout the tropics around the globe.

Among about 700 trees now known to fix nitrogen, none are more versatile than *Leucaena leucocephala*. As a native of Yucatan, the inoculants are already present in our soils. It is pest resistant in its native environment because of the insecticidal properties of mimosine, a non-protein amino acid.

Leucaenas thrive on shallow limestone soils, coastal sands and seasonally dry vertisol soils of pH 7.0-8.5. This is not surprising as a native to the Yucatan, being a limestone shelf hanging over the Gulf of Mexico.

These legumes are highly drought-tolerant once established. They prefer subhumid and humid climates from 650-1,500 mm and up to 3,000 mm annual rainfall, and they tolerate up to 7 months dry season! On the other hand, this species does not tolerate waterlogged soils or extended periods of flooding greater than three weeks.

Leucaena is highly valued worldwide as ruminant forage (cattle and goats), as a source of fuel wood and charcoal, pulp for paper and rayon, leaves for fodder and green manure, shade for trees like coffee and cacao, timber for buildings, furniture, poles and crafts, and its seeds for crafts, and its gum for glues.

**Forage:** Of interest to the cattlemen of Belize, as ruminant forage, leucaena has the highest quality feed of any tropical legume, and the potential to produce the highest weight gains. Steers can gain 300 kg of live weight in a year with adequate leucaena, and irrigated leucaena has produced over 1000 kg of LWG per ha per year.



Foliage of *L. leucocephala* has one of the highest digestibilities (60 to 70%) for ruminant animals among tropical legumes and grasses. Annual forage yields are

very high under good management, ranging over 20 tons dry matter/ha with 3-month harvest at population densities exceeding 50,000/ha. Cattle and goats make superior gains on grass supplemented with 20 to 30% leucaena.

Range grazing is the most economic management, with leucaenas intercropped in fully prepared seed beds in hedgerows, spaced 5-8 m and grass between. This legume is extremely tolerant of regular defoliation by cutting or grazing once established. It has been shown to have a half-life of 23 years under regular grazing. Leucaena will not normally spread under grazing as cattle relish young seedlings.

Leucaena contains mimosine, a non-protein amino acid that is acutely toxic to animals but is normally converted to 3-hydroxy-4(IH)-pyridone (DHP) upon ingestion *in a ruminant*. It is recommended that the diet not consist of more than 30% leucaena. The anaerobic rumen bacterium, *Synergistes jonesii*, occurs in most countries in the Americas and completely detoxifies DHP and its breakdown products.

**Shade:** Leucaena has long been used as shade in tropical plantation crops of coffee and cacao. The Toledo Cacao Growers Association is now recommending this native for shade in new plantings, due to its rapid growth and canopy closure, its suitability to the local soils, and the future nitrogen capacity for the farmer, especially those desiring to grow organic crops.

Leucaena has been grown in dense rows as a living fence, and it can be used to support vine crops such as pepper and passion fruit.

**Instant Forests:** "Instant" forests can occur when leucaenas are transplanted well, with canopy closure in 3 months. They can grow to a mature height of 13 to 18 meters in 3 to 5 years. Mean annual wood increments range from 20 to 60 m<sup>3</sup> when population densities are over 5000 trees/ha. The wood of 5-yr-old trees has a brown heartwood that reddens with age and can serve well for posts, parquet flooring, furniture and lumber.

**Fuel:** The wood is a preferred rapidly renewable fuel wood internationally. It burns slowly with little ash or smoke, and makes an excellent quality charcoal.

**Green Manure:** 'Grow Your Own Nitrogen' is a motto that deserves wide application in the tropics, as soils become increasingly impoverished. Leaf litter yields from solid plantings of leucaenas exceed 10 tons/ha (dry) with up to 300 kg nitrogen/ha.

How blessed is Belize to have another native as versatile and productive as *Leucaena leucocephala*.

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# The Effect of the Moon on Agriculture

By Dottie Feucht

## September 2011



## October 2011



Mayan agricultural traditions and practices have been passed down from father to son as long as the Mayas have been in Belize. Remijio Tzib, who lives in 7-Mile Village in Cayo District, says his father, Rudolfo, started passing down his farming methods to him when he was 14 years old. Remijio is now passing them down to his 4 sons. Having heard stories about the effect of the phase of the moon on agriculture I asked Remijio about it. He says it is one of the important lessons that he learned from his father. "For example," he says, "We know that branches for thatch must be cut when the moon is full. If they are not they catch beetles and worms and other insects that destroy the thatch branches and the roof doesn't last long. Fence posts are another example. If we want fence posts to be 'living' posts (start growing again after being put into the ground for fencing) then we cut the trees for the fence during the *new* moon. If we

want dry posts for the fence we cut the trees when the moon is full and dig post holes during the new moon to prevent the dry posts from rotting in the ground." Grape vines should also be cut during the full moon.

Many crops are also sensitive to the phase of the moon for both planting and harvesting. From experience, Remijio says that plantains should be planted during the last quarter of the moon or the plant will grow too fast and the fruit split before it is mature. All *above ground* plants and annual crops that produce their seeds outside the fruit, such as yams, cassava, peanuts, lettuce, spinach, celery, broccoli, cabbage, cauliflower, onions and grain crops should be planted during the first quarter of the moon. Cucumbers are included in this group also, even though they don't produce their seeds outside. Generally, the best time to cultivate, harvest, transplant and prune is in the fourth quarter. It is also the best time to plant vine crops to avoid the plants growing too fast and producing less fruit. Harvesting root vegetables and potatoes are best done during a descending moon – third or fourth phase, but most other vegetables are best harvested during an ascending moon – first or second phase. The time to avoid harvesting is the full moon; the reason may be that crops hold too much moisture for satisfactory storage. According to Remijio's experience, if corn and beans are not harvested at the right time they will catch weevils more readily; peanuts will be wormy. The new moon phase is the best time for trimming grass and weeding crops because there is more activity underground in the soil and the flow of sap in plants is less strong; so growth is retarded during this time. Therefore, it is also a good time for turning under green manure.

*Continued on Page 26*



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## DEAR RUBBER BOOTS,

I have heard that there is a difference between Dutch processed chocolate and other chocolate? Can you tell me what that difference is and how it affects the use of either one?

Sincerely,  
D.F., Chocolate Lover

Dear Chocolate Lover,  
Dutched or Dutch-processed cocoa powder, takes this name because the process was invented by a Dutchman, Coenraad van Houten, shortly after his father, Casparus van Houten developed a hydraulic press for extracting the greater part of the fat (cocoa butter) from the crushed beans (chocolate liquor) in 1828. Having this fat removed (cacao beans are 54% fat) increased digestibility and also paved the way for the creation of dry cocoa powder, and the Dutching process for it. Both innovations were responsible for the tremendous growth and mass production of chocolate. One tale of the origin of the Dutching process is one of the van Houtens was traveling in Central America and saw a Maya medicine man adding fire ash to cacao – intriguing him and stimulating his experiments back in Holland. These van Houtens as well as some of the other first chocolatiers were in fact chemists.

The Dutching process, similar to the Maya tradition, involves adding alkaline salts (potassium or sodium carbonates) to the naturally acidic beans. (Cacao beans have a pH of 5, raised to approx 8 by Dutching.)

There are basically two types of cacao powder (both unsweetened) – Dutched (aka alkalized) and natural, which is as its name infers. Cooks in the know realize one should not substitute one type for the other, without altering recipes to accommodate the switch. (See instructions below.)

The Dutching process: a. lowers acidity, b. increases solubility, c. enhances color (darkens and reddens it) and d. smooths flavor. Dutch-processed cocoa should be used in recipes calling for baking powder, dependent on other acid ingredients. The delicate flavor of Dutched cocoa is preferred in many cakes and pastries.

Natural cocoa powder tends to be more bitter, but also more rich and intense. It is generally preferred in brownies, cookies and some cakes.

Note: Dutching the cocoa does lower the flavanol (anti-oxidant) content, compared to natural cocoa. Even though studies found a range of between 60 to 90% loss, the antioxidant level is so high in cacao, (20 times that of blueberries) that either way cacao is still an excellent source of antioxidants.

Joy of Cooking website offers the following substitutions for Dutched and natural cocoas. Read more: <http://www.joyofbaking.com/cocoa.html#ixzz1UoV2qjZQ>

“Substitution for 3 tablespoons (18 grams) Dutch-processed cocoa: 3 tablespoons (18 grams) natural cocoa powder plus pinch (1/8 teaspoon) baking soda

Substitution for 3 tablespoons (18 grams) natural cocoa: 3 tablespoons (18 grams) Dutch-processed cocoa plus 1/8 teaspoon cream of tartar or 1/8 teaspoon lemon juice or vinegar

Note: Do not confuse unsweetened natural and Dutch-processed cocoa powder with sweetened cocoa drink mixes. They are not the same thing.”

There are 3 excellent Belizean brands of cocoa powder available locally – Cotton Tree, Cyrila’s and Goss, all natural type. Dutched are normally labeled either ‘Dutch Processed’ or ‘European Style’, while natural types usually just read ‘cocoa powder’. Enjoy!

Truly, Rubber Boots



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# Making a Simple “ Rain Gauge “

By Hugh Leyton



Get a regular 1 gallon bleach or similar plastic bottle. Cut the bottom off, just below the ridge about 3/4” from the bottom, so that you still have that ridge, but the opening is the same diameter as the main bottle. Then find a place in the garden to hold it upside down, where the rain can fall into it, without being screened by a building or trees. Prop it up between three concrete blocks, to prevent it being blown away.

There are two ways to measure the collected water. First is a simple direct reading according to the following:



### Collected Water

### Rainfall

50 mm or 2” deep	=	6 mm ( 1/4” ) Rain
75 mm 2 3/4” deep	=	12 mm ( 1/2” ) Rain
90 mm 3 1/2” deep	=	18 mm ( 3/4” ) Rain
100 mm 4” deep	=	25mm ( 1” ) Rain
The ridge or handle shelf	=	30mm ( 1 1/4” ) Rain

After that it is straight measurement, one for one.

4” deep = 1” Rain  
 5” deep = 2” Rain  
 6” deep = 3” Rain  
 etc.

The second method is using a calibrated measuring bottle. To calibrate the bottle, measure the opening diameter of the collector bottle. Measure the inside diameter of a straight sided bottle. Check this accurately by cutting a piece of cardboard that just touches both inside sides,

without it bending. Divide the diameter of the collector bottle, say 6”, by the diameter of the bottle to be calibrated, say 2”, to get 3, then multiply this number by itself, in this example, 3 x 3 = 9. To mark the measuring bottle, just mark measuring lines every 9 mm for 1 mm rain measurement, or 0.9” inch for 0.1” inch of rain, etc.



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 South & 7th Ave.  
 Tel: 422-2862

**Orange Walk**  
 3 Guyana Street  
 Tel: 322-3814

**San Ignacio**  
 Esperanza Village  
 Tel: 824-2025/  
 824-2385

## Moon Effects, Continued from Page 23

Some people think the moon phase effects are hokey, but Dr. Frank Brown of Northwestern University conducted research over a ten-year period, keeping meticulous records of his results. He found that **plants absorbed more water at the time of the full moon.** That means that during full moon there is good absorption of liquid manures. He conducted his experiments in a laboratory without direct contact from the moon, yet he found that they were still influenced by it.

It was Sir Isaac Newton who established the laws of gravity, which explains how tides are affected by the **gravitational pull of the moon.** The pull of the moon is stronger than the sun because, even though the sun is larger, the moon is closer to the earth. The strongest effect is felt when the moon and sun pull from the opposite sides of the earth, at the full moon phase, although it also creates high tides when they are on the same side (at the new moon) as well. These same forces affect the water content of the soil, creating **more moisture in the soil at the time of the new and full moon.** This increased moisture encourages the seeds to sprout and grow.

The phase of the moon also affects cattle. The late John C. Roberson, Sr., well-known cattle rancher, never worked cattle at full moon and castrated them only during a waning moon. He also found out the hard way when he lost 3 calves in the chute that they should not be worked in corral during a full moon. It is also during the full moon phase that there is an increase in insect activity, particularly slugs and snails, and internal parasites.

So if you are not getting satisfactory results from your gardening or crops maybe you should consult the calendar and schedule your planting and harvesting according to the phases of the moon.

## AG BRIEFS



Western Dairies, the largest dairy in Belize, currently packaging approx 22,000 lbs (2,750 gals.) of milk daily, is waiting for delivery from Israel of new UHT (ultra high temperature) processing equipment. The new packaging, for white, chocolate, low fat and skim milk, will be in liter and 250 ml containers, with a greatly expanded shelf life over the current refrigerated milk products. Western Dairies projects that approximately half of their milk will receive the UHT treatment and that they will be available in stores in January 2012.

A new Act passed by GOB, finally makes it law that payments for cess on all cattle sold for local slaughter is now mandatory and must be paid to BLPA (Belize Livestock Producers Assn). The rate for cattle slaughtered in country is \$8. per head, and butchers are responsible for these collections from the producer. For cattle exported for slaughter the rate (until fixed by BLPA with approval of the Minister) will be \$10. per head plus 2% tax ad valorem on the sales value. For cattle exported for breeding the tax will be 2% ad valorem on the sales value.



## CONSTRUCTION

501-662-5263  
501-662-5700  
crbelize@gmail.com



## WORLD EGG DAY



The Belize Poultry Association will be celebrating World Egg Day along with the other countries in the region and around the world at FAO World Food Day to be held at Central Farm on Friday October 14, 2011. Come visit our booth! As a matter of fact we will celebrate **Egg Week** from

October 9 to the 15th. We will be on the radio morning shows and TV shows and in the schools. Our slogan for the week will be *You Need to Eat Well In Order to Do Well Every Day!* Since there is no limit to the number of eggs a person can eat daily, the BPA is calling on all who may have some influence on reducing nutritional poverty in Belize to encourage others to eat eggs at any meal in order to increase nutrition and contribute to a balanced and healthy diet. Remember, **the egg is nature's almost perfect Food!**

**Belize Poultry Association**  
San Ignacio, Cayo District, Belize

## FOR SALE

**40 Ft. Trailer with Office and Work Benches**  
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## Local and Regional Fuel Prices

	Belmopan, Belize	Quintana Roo, Mexico	Peten, Guatemala
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PREMIUM	↓ \$11.29 Bz/Gal	↓ \$6.92 Bz/Gal	↓ \$10.14 Bz/Gal
DIESEL	↓ \$10.19 Bz/Gal	↓ \$6.48 Bz/Gal	↓ \$8.90 Bz/Gal



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*TCERBELIZE.COM or see the Belize Ag Report Sept/Oct issue*



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