The Belize Ag Report

Belize's most complete independent agricultural publication

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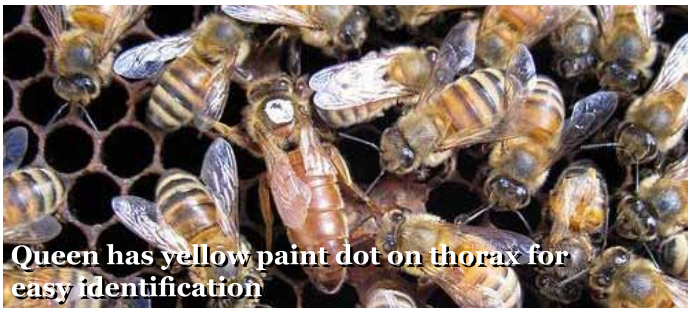
The Queen Honeybee

By JoAnne King



Queen has yellow paint dot on thorax for easy identification

A miracle in the beehive: this is the best way I can describe the Queen Honeybee. Her creation and design can only have come from above. Her life begins as an egg. It looks like any ordinary worker (female) egg in the cell of a honeycomb, white, and about the size of a thin mechanical pencil lead, no more than a 1/16" long. If the worker bees see that their queen is seriously failing in egg laying capacity or health, or they know the colony is about to swarm they will set about to raise a new queen. The worker bees may take an egg and put it into a queen cell which workers have constructed from beeswax or the old queen herself will lay worker eggs in queen cells in preparation for swarming. Worker bees must then care for the larva. These selected larvae must be fed royal jelly for the entire period of larval growth from day 3 to day 10 of the 16 days of the queen's development into an adult. The queen cell looks like a peanut and can be found on the face of a brood comb or hanging from the bottom bar of a frame that holds a comb. Worker and drone larvae are provided with royal jelly for only three days, then are switched to a diet of a mixture of honey and pollen known as "bee bread" for the balance of their larval feeding. The physiological differences that result from the different diet are a miracle! To think the feeding of royal jelly to a larva will produce this egg laying machine which can lay up to 1800 eggs in a day is incredible. She will differ from the worker bees in numerous ways, including:

1. Her abdomen will be longer and her body slightly broader.
2. Her thorax (center section between head & abdomen) will be shiny instead of fuzzy.
3. She will have fully developed ovaries for laying fertilized eggs.
4. She will have a stinger with rounded barbs. (Workers have sharp barbs on their stingers thus losing them when they sting and dying within minutes afterward.) A queen is able to sting another competing queen without losing her stinger.

At about one week old the adult queen takes a series of high altitude (80'-100') mating flights, mating with several drones who die afterward and she is mated for life, as long as her spermatheca contains sperm; two years is common, though she may remain viable for 3-4 years. Upon returning from mating flights she reenters the same hive she issued from even if there are 100 or more hives in the bee yard.

Queens are commonly bought and sold in the U.S., being shipped all over the country via Fed Ex, UPS or U.S. mail. During the 2012 season they were priced at about 17 USD each. They vary in color according to their type & race. There are Italians, Carniolans, Caucasions, Africanized (Central America) and others, with genetic traits that vary widely and offer queen breeders the opportunity to select for the most desirable traits.

It is always exciting to find the queen bee in a hive. I hope you now understand better why the word "miracle" comes to mind when I think about queens, and if you ever have the opportunity to see first-hand some of the miracles in the bee hive (accompanied by an experienced beekeeper) I hope you will find it a rewarding experience.

Editor's Note: JoAnne King is a commercial beekeeper from ND, US who has been in the business there with her husband for 25 years. They have enjoyed the profession together, adapting to numerous changes in beekeeping over that time.

To THE EDITOR

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

Greetings:

I received no indication that my subscription had expired, so it lapsed. Assuming nothing has changed, I am enclosing my check for $30BZ for another year's issues.

If Belize is to survive as a country, it must do so on the strength of its agricultural base. Communication is the only way this base can be viable and effective, and to that end Belize Ag Report plays the key role. Its articles are professional and pertinent and should be the guide to all the privately owned and operated farms and ranches in the country as well as being a unifying influence.

Regards,

Bruce Ferguson

San Pedro Town, Ambergris Caye

Editor's note: Sorry Bruce! We appreciate your loyalty and will try to improve our systems. Thank you for your comments. The Belize Ag Report is now entering into its 5th year of publication, thanks to input from readers, writers and advertisers.

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Mrs Roberson,

I have spent an enjoyable afternoon reading the latest edition of THE BELIZE AG REPORT.....What a wealth of information on a splendid variety of articles and opinions!

After reading the comprehensive articles I felt as though I had taken a college course! We are blessed to have such talented writers share important knowledge with the community.

Each article impacts my life here in Cayo in some manner, and the opinions shared on current subjects and views have clearly tickled my own thoughts. Also, fun to read, I perused every ad and found new information....

I believe the magazine should be required reading in schools. Your outstanding ability to create a shared sense of community, interest, information , and stimulate the thought process on subjects pertinent to Belize will certainly find seed in fertile minds of the future.

Thank you,

Miss Chai

Response to GMO Technology Fear or Future? (Issue 21, page 5)

Dear Editor,

"Como me arrepiento no haberme impuesto y haber dicho no a tanta noveleria."
Rafael Correa, President of Ecuador, September 1st, 2012.

Mr. Hugh O'Brien began his article last issue with this lament by the President of Ecuador as some sort of proof that GMO production should be the preferred national strategy for Belize. Perhaps Mr. O'Brien chose to reference Correa as a model for Belize because of the similarity Belize shares with Ecuador in defaulting on smothering international debt obligations. Although unlikely, perhaps Mr. O'Brien chose Ecuador as Belize' model because of Ecuador's diversity – for its size, Ecuador has the greatest bio-diversity on earth. It was in recognition of its great treasure that the writers of Ecuador's Constitution chose to permanently inscribe the mandate for "strengthening diversification and the introduction of environmentally friendly technologies and organic agricultural production, promoting the preservation and recovery of agro-biodiversity and ancestral knowledge linked to it, as well as the use, conservation and free exchange of seeds." (Art. 281.3 & 6).

But perhaps, because Ecuador has NOT opted for genetically engineered crop production, but has instead mandated against them through the nation's Constitution, just perhaps, Argentina would serve as a better model of what GM production might mean for Belize. It is likely that Correa was looking at Argentina when he lamented Ecuador's preference for food sovereignty over dependence on foreign agro-business and a few international food corporations. One only needs to look a little farther south, to the first example for debt-defaulters, Argentina, for a country that tells the GM story.

Argentina is the third largest grower of genetically modified (GM) crops globally, following only the US and Brazil, and is the largest supplier of GM soy in the world. A little more than one decade ago Argentina was bankrupt and had defaulted on its international debt obligations. Almost miraculously, Argentina turned its economy around, many say largely a result of planting GM crops. Where gauchos and grazing cattle roamed the pampas, today vast soy plantations of Monsanto's genetically modified plants dominate the landscape. Over half the arable land in the north country is devoted to growing soy and for every tonne of soybeans exported, the government takes its cut.

The commandment not to covet Argentina's coffers may seem an impossible task for Correa.

Seventeen years ago, the Argentine Secretariat of Agriculture began to staff its regulatory body with GM biased stakeholder representatives and agro-industry personnel. They set up a framework within Argentina to regulate GM crops and approved the first GM crop – glyphosate tolerant soybeans (GTS) – in 1996. Today GM applications are assessed on a "case-by-case" basis and Argentina boasts a policy based on flexible, rational science. More

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

To the editor Continued from pg. 4

than two thousand applications have been assessed in Argentina in seventeen years.

Argentina has raked in the taxes, while very big farmers became very, very rich, and Monsanto continues to laugh all the way to the bank as GMO production spreads all across the South American continent.

But there is **no food sovereignty** in Argentina, the#1 soy exporter in the world. Soybeans are not traditionally eaten by Argentines; they are exported for poultry, oils and additives. As GTS soybean production has risen, hunger has increased in Argentina to unprecedented levels. The "Soya Solidarity" movement, begun when export prices were low, encouraged the consumption of soya as a protein supplement for humans, but, unfortunately for the poor, they were much better off from the nutritional benefits of beef and dairy products, proteins that were once the mainstay of the Argentines diet, and which prevented the anemias a soy based diet is creating.

The demand for more and more arable land for cultivation of soy to export has resulted in farmers being forced off their land, murdered and kidnapped, wells poisoned and crops set afire. Deforestation is reported in the Yungas and Chaco regions where now 30% of production is by "soy pools", or financial speculators that buy or lease land from small farmers who can't afford high production costs. In the area around the northern city of Cordoba, Argentina, where glyphosate resistant GM soy is grown, cancer rates are forty-one times the national average. Congenital deformities, lupus, haemolytic anemia, respiratory disease, neurological problems and infant mortality are also far higher than average.

In 2009, Argentine President Cristina Fernandez formed a national commission to investigate agrochemicals under the Health Ministry. The report's final recommendation stated: "Because there is not enough data in Argentina on the effects of glyphosate on human health, it is important to promote future research." The confidence of Argentina's regulatory bodies in GM technology, whose "sound and strict biosafety guidelines" and "underlying regulatory principle of safety" is incongruous with the increased cancers, neurological problems, infant mortality and respiratory disease now being connected to the cultivation of genetically modified crops. That incongruity begs the question: What does a risk assessment of GM plants need to reveal to lose approval, if not the tandem increase of miscarriages, birth defects and cancers on one hand, and the increase in soya plantations on the next? The incongruity is echoed in Monsanto's statement to Dr. Medardo Vasquez, Neonatal Specialist at the Children's Hospital in Cordoba, who has charted the correlation of GM soy to birth defects in children. Monsanto's response: Round Up (glyphosate) brand agricultural herbicides have a long history of safe use… comprehensive toxological studies have demonstrated that glyphosate… does not cause birth defects or reproductive problems.

Argentina's rapid agricultural expansion is in part due to the cultivation of soy in land that was for decades pastureland. As soil fertility decreases with the nutritional demands for plants in glyphosate-laced soil, yields are also reduced. As yields decrease the rise of herbicide resistant weeds increases. As weeds increase, the need to use increasingly toxic herbicides increases causing even greater damage to health and environment.

Argentina committed itself to the production of commodities for export at the expense of its own natural resources and future generations, in order to service its debts. This focus on exports is the standard prescription of the international financial institutions. The effect is to deprive countries of control over their own development, repeating the pattern of the colonial period. GE crops have played a key role in facilitating this process in Argentina.

President Correa and Hugh O'Brien must keep their eyes wide open. Time will tell which country's citizens will emerge as winners.Time will judge the legacies of these two South American countries: Argentina's legacy of large, short-term gains, moving from bankruptcy to short term solvency,which follows the colonial development model of relying on a single export cash crop to First World Nations leading to food dependence, polluted soil and water, disease, inequality and unemployment or Ecuador's legacy of environmentally friendly technologies, diversification, preservation, conservation and free exchange of seed.

Belize, it makes practical sense to review the data on GMOs worldwide, not limiting ourselves to studies of yields and relying on information provided by industry linked regulators. We need a thorough, comprehensive, scientifically sound and rigourous risk assessment that includes input from the relevant Ministries of Health, Environment, Trade, Human Development, as well as Agriculture. We must avoid the temptation of short-term financial gains for the few at the expense of a long-term vision to benefit the many. Farming GMOs is not a sustainable option. The Argentine case should sound the alarm for any country seeking to defend its food security and sovereignty.

Miriam Deshield

Belize City

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Response to Energetic Agriculture (issue 21, pg. 6)

Letter to the Editor

Dear Bill,

I have read your article entitled "Energetic Agriculture & Pests, Farming Without Chemicals" in the Belize Ag Report, Mar-Apr 2013 Issue #20 pg's 6, 24. I am dismayed at what seems to be your lack of understanding of chemistry and soil sciences. I will touch lightly on theoretical constructions as it is needed to counteract your misunderstanding or misuse of studies of reputable scientists including Einstein, LaMotte, Reams et al. First, neither people, plants nor soils take apart the atom and put it back together again but rather reactions occur that change the electronic arrangements. Many scientists including LaMotte have formulated field tests which address not the "total" value of soil nutrients but rather "extractable", "available" or the "exchangeable" ions and species. As to the testing, test kits suffer from lots of errors and false positives as they have large error factors due to inappropriate extraction methods, incomplete treatment of interferences, pH control, inadequate sensitivity and poor quality control. Soil tests by themselves can be meaningless, even harmful, in an absolute sense although they can provide some *relative guidance* to historical records. What is your proof to your statement that LaMotte test kits are "most reliable"?

It is a fact that nutrient-dense foods are the opposite of energy-dense foods since one predominates the other in a ratio. One does not grow nutrient-dense foods by technique but rather by varietal selection. Rescue chemicals you fail to adequately explain. Here is a question for you to answer - If I use a solution of ground garlic and onions as a pesticide, is that a rescue chemical? My point is you have mixed up a number of words in trying to tell us that rescue chemicals are bad. I even take issue with your implications in the term "rescue". Is mined phosphate rock a natural or artificial fertilizer?

The paragraph, Healthy Soil, states that "Dr. Callahan – the greatest scientist of the late twentieth century….." is a claim of your own loose superlatives.

I have a hard time understanding just exactly what you mean by energetic agriculture. First of all agriculture systems – plants, bacteria, animals, soil, water, air, nutrients are all chemical energy systems (chemicals and combinations of forms of chemicals) that must obey the energy laws or Laws of Thermodynamics - all the time. All chemicals (elements and molecules) in their rest or standard states (unreactive) contain energy but are electrically neutral.

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Bt As Organic Spray

Bt(bacterium thuringiensis) is accepted in *certified organic applications* as a spray. Bt normally exists in the environment and is concentrated for use as a controlling item in the caterpillar stage of a moth. Bt does not naturally penetrate the cellular wall of a plant cell. If a caterpillar consumes the cell, and the Bt is present on the exterior of the cell structure, then the Bt is active in the gut of the caterpillar, thus blocking the absorption of the nutriments of the cell that is consumed. The caterpillar has a very simple digestive tract that has only one purpose: consume and absorb the nutriments for energy to grow. Bt exists in all surroundings as a bacterium. This is the reason a moth lays hundreds to thousands of eggs; population density ensures that the species will survive, even if the environment creates a high population of Bt at that given time. As humans, we digest Bt, and our acids of the early digestive tract destroy the bacterium. This is due to the fact that the exterior of the cellular structure that we are consuming is broken down first in the digestive tract; further in the digestive tract, the cellular wall of the singular cell is broken to allow digestion of the interior components of the cell.

The cellular wall of plants and animals are constructed of lipids, which allow the resistance and protective barrier of the cell internals. The RNA inside of the cell determines which items are allowed to penetrate the cellular wall and enter the interior region. Normal Bt as an external application will never penetrate the cellular wall, due to being rejected as a foreign material.

When the Bt is forced inside the cellular wall through a virus introduction or gene gun, as is the case in genetically modified seeds, the Bt is positioned in a location that it would never exist otherwise. If an insect or animal consumes the cell, the early digestive tract cleans the cellular exterior, and then passes the cell further into the digestive tract to break apart the cellular structure and digest the interior components. Due to the Bt being inside of the cellular walls, this part of the digestive tract has never been introduced to the bacterium before. Without further studies and a lot of research in the reactive impulse of this part of the digestive tract to the introduction of the bacterium, results are unknown.

To provide an equally responsive example, if botulism is introduced into the large intestine, rather than the stomach, what are the results? This all pertains to the various absorption criteria for the different levels of the digestive system. As is a common fact, the stomach absorbs most medicines; if the medicine is encapsulated, delaying absorption until the small intestine or large intestine, what is the reaction to the entire body? This would be stepping outside of the normal, consistent process of digestion.

In short, naturally our bodies are used to Bt as an exterior item, and can destroy it early in the digestion process, but when introduced later in the digestion process, how can our digestive tract react if the normal method of destroying the bacterium through acid is not present? Without this destruction it will be absorbed.

Success is not the key to happiness; happiness is the key to success. If you love what you are doing, you will be successful.

International Seed Treaty
A Hope to Reduce Global Conflict Over Genetic Resources

By Maruja Vargas

On 29 June 2004 the International Treaty on Plant Genetic Resources for Food and Agriculture (popularly known as the International Seed Treaty) came into force. The treaty ensures that plant genetic resources for food and agriculture, which are vital for human survival, are conserved and sustainably used, are kept accessible and in the public domain, and further, that benefits from their use are equitably and fairly distributed.

The treaty was negotiated by 164 governments under the auspices of the Food and Agriculture Organization of the United Nations (FOA) and was agreed by consensus by the FAO Conference on 3 November 2001. The Convention on Biological Diversity has welcomed it as it covers the plant genetic resources of an exceptional set of biodiversity - *agricultural biodiversity* - that need special treatment. Signed or acceded by 85 states including the United States and all 15 states of European Union, the ratifications of this treaty are the most rapid of any international agreement in recent history and are evenly spread between industrialized and developing countries underlining the global urgency on food security.

In the past century, 95% of food crop varieties have been lost from farmers' fields. Four crops - rice, maize, potatoes and wheat - provide more than half the dietary energy of humanity. The loss of the wide diversity of varieties of these crops will have severe implication to the food security of the planet given environmental degradation, pests, epidemics and climate change.

The treaty legally ensures conservation of the myriad varieties of the world's most important food and forage crops and their free availability to new generations of farmers worldwide. The treaty covers all plant genetic resources of importance to agriculture. However, for 64 key food crops and 29 forage species that account for most human nutrition, it establishes a unique Multilateral System of Access and Benefit-Sharing (MSABS). It is a form of limited common property. In exchange for access to this communal treasury held in government and international seed banks, private parties creating commercial products that incorporate materials from the MSABS must pay a percentage of their profits into a trust fund. The funds in the trust account are to be used to promote benefit-sharing, particularly by farmers in developing countries. This is an important departure from the original delineation in the Convention on Biological Diversity which recognizes the sovereign right of states to control plant genetic resources within their borders and to regulate their use through national laws and bilateral contracts with seed and commercial companies. This aspect is now dramatically changed.

Benefits are to be shared through information exchange, technology transfer, capacity building, and the mandatory sharing of the profits of commercialization. The provision of the treaty should outlaw patents on 64 major food crops but the clause which bans patents is open to interpretation. The contested issue is how to define the boundary between biological materials that remain in the public domain and those that can be privatized.

Further the treaty should ensure realization of farmers' rights to

- freely access genetic resources unrestricted by intellectual property rights (patents for example),

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BAGMO Presents

What did we learn during March's...

GMO AWARENESS MONTH

WHAT is a GMO?

We learned that a GMO is a Genetically Modified Organism. This means that it was made by man in a laboratory. It is not natural. Genetic material (DNA) from one species is inserted into another, crossing things that would not be able to breed in nature. Here in Belize, in their efforts to control an ear worm problem, a group of grain growers want to bring in GMO corn seed that actually has pesticide inside every cell of the plant. If they are successful, this would be this first GMO crop in Belize. These farmers believe that GMOs can be controlled… remaining within the boundaries that they plan to establish. We learned that there is no containing GMOs and contamination happens.

GMOs & the ENVIRONMENT

We learned that the Bt toxin in the GMO corn is not the same as the Bt toxin found in the soil or in the BT spray used in the past. This synthetic Bt toxin in the GMO corn is not destroyed naturally by sunlight or rain. It remains in our soil, then works its way into our water supplies. It is unknown at this time what the effects of this pesticide are on other essential organisms found within our ecosystem. We DO know that this GMO corn seed cross-pollinates, causing contamination. Organic farmers can lose their livelihood. GMOs cannot be contained.

GMOs & YOUR HEALTH

We learned that GMOs were approved to be grown and added into our food supply without undergoing any independent testing. Most processed foods that we eat contain GMOs. Since GMOs we added into our diets, the rate of intestinal diseases (as well as allergies and many other conditions) have increased dramatically. If we ARE what we eat, is it in our best interest to be ingesting a pesticide on a daily basis? The only long-term feeding study on rats showed excessive cancerous tumor growth, kidney damage, infertility, sterility and early death.

LEGAL & ETHICAL ISSUES

We learned that Monsanto Corp. successfully acquired patents on the seeds that were genetically modified by techniques they developed. This has opened a Pandora's Box onto the world, allowing corporations to OWN the seed… the LIFE FOOD… of the planet. We learned that this monopoly, this control of our food supply serves only 5 large agro-chemical companies. GMOs do not offer anything desirable to the consumers and only short term gains to the grain growers. The inevitable cross-pollination and contamination lends itself to lawsuits, livelihoods lost and environmental biodiversity compromised.

THE CONVERSATION MUST CONTINUE

JOIN the Facebook group: **Belizeans Against GMOs** (BAGMO) at: **https://www.facebook.com/groups/bagmo/**

To review data from ***GMO Awareness Month***, go to: **http://www.belizeansagainstgmo.info/index.html**

BEYOND THE BACKYARD

The Money Trees

By Jenny Wildman

Aaromas and piquant flavours. The popularity of certain spices can be attributed to the practice of Humoral medicine gleaned from the ancient Greeks who taught that the balance of the major bodily fluids (humors) was the key to human health and emotions. Spices were used to stimulate the senses and it was this belief that fueled the quest for discovery and kept the spice trade booming. During medieval times Muslim traders controlled the maritime routes and, secreting their information, sold their cargoes to the middle men, the merchants of Venice. After the fall of the Byzantine Empire the Ottomans seized and blocked the trade routes, levying huge taxes on all. The Europeans not wanting to be controlled by non-Christians increased their flotillas and set out to discover alternative routes to the spice islands. Initially it was to provide for the wealthy. There was a lot at stake and nutmeg became a more lucrative commodity than gold. During such a voyage the American continent was discovered. Success in finding a way to the spice islands of Banda, Indonesia created fierce competition with nations vying for control of the spice trade. The Dutch gained Banda Island the principal place of nutmeg by death or deportation of its inhabitants. The British controlled the Isle of Run but the Dutch were prepared to go to great lengths to gain the monopoly. After much blood shed the British relinquished their hold of the neighbouring Run in exchange for New Amsterdam, now Manhattan- New York City, renamed by the Brits. The British had already smuggled out nutmeg stock and were able to replant in the Caribbean West Indies beginning with Grenada.

The nutmeg tree (MyristicaFragrans) is an attractive evergreen which bears a yellow fruit that opens to reveal a red lacy covering which will make the spice mace and further a hard seed from which nutmeg comes. It is a dioecious tree having both male and female trees and unfortunately it takes about 6 years to find out which is which and 7-10 years to start bearing. It now grows in many places with tropical climates. The yellow skin is tasty but stains clothes and can be used for sweets or jams. Mace colours food a beautiful bright orange and is therefore good in sauces and stews. The nutmeg flavour comes from the eugenol oil which can also be used in cosmetics and perfume.

Nutmeg should be kept in its shell and stored in a dry place and this way will keep for 30 years! However you will be using it to detoxify liver, aid sleep, improve concentration, relieve pain, improve skin, possibly prevent and dissolve kidney stones, mix a little powder with honey and use as paste on scars, add to massage oil, enhance clairvoyance and, as an amulet, bring good luck and fortune.

Nutmeg is antibacterial and a common ingredient of toothpaste and in Money Drawing Oil used in candles and incense to bring money to the household. During the plague Black Death people wore spice bags of nutmeg for protection which may actually have been beneficial as it warded off the fleas that carried the bacterium. So you could try that on your pets. As a culinary champion most think of holiday egg nog or grated on cappuccino but it can be added to baked goods, vegetables, quiches, tourtiere, pumpkin pie, and sausage. Both nutmeg and mace are used in haggis.

Nutmeg should be used sparingly as it is strongly flavoured and contains myristicin a mind altering hallucinogenic. There was a rush of intoxication epidemics in early 1900 and again in the 1960's from nutmeg overdose.

I would certainly like to grow nutmeg trees for the fruit but also as they are very pleasing to the eye.

The word spice conjures up tropical islands, sultry nights, sensual Another evergreen tree of beauty with multiple uses is the Allspice tree (Pimenta Dioica) of the Myrtle family. This is native to Central and South America. Allspice was used as an embalming agent by the Maya, for flavor to chocolate and for curing meats. It was introduced to Europe in the 16th century. To protect its trade of allspice with Europe, Jamaica would not allow the plant to be exported and it was long thought to be its only habitat. Thankfully this spice never incited riots or was blamed for Colonial bloodshed. The Spanish explorers thought it was like black pepper so called it Jamaican pepper (Pimento). The English likened it to a variety of spices: nutmeg, juniper, cinnamon, cloves and pepper, therefore called it allspice. This is the taste of the Caribbean used in both sweet and savoury dishes, the main ingredient of jerk seasoning, BBQ sauces, pickling spice and sausages. The leaves and wood are used for smoking meats. Allspice is an ingredient in the liqueurs Benedictine and Chartreuse. The leaves can be used in place of bay leaves but do not keep as well therefore have little commercial appeal. The principal essential oil again is eugenol. As a fragrance it has a virile masculine quality and is used in deodorants and other men's toiletries.

This Pimenta also needs male and female trees for cross pollination. The female tree begins to bear fruit after 3 years. The berries are harvested green to conserve their aroma by picking small branches of berries and drying them in the sun until a dark reddish brown.

As an aid to healing it can be used to stimulate appetite, dispel toothache like cloves and as a antibacterial mouthwash. It can be used as a rub for sore muscles like bay rum and to increase circulation. The magical power of allspice is again associated with attracting money.

So to tickle your sense of humour and spice up your life, add nutmeg and allspice to kitchen and garden.

Good luck and send any information you would like to share to

Jenny Wildman

spectarte@gmail.com

International Seed ...Continued from Page 6

- use, save, sell and exchange seeds,
- protect relevant traditional knowledge,
- participate equitably in sharing benefits derived from the use of seeds, and
- participate in national decision-making related to the conservation and sustainable use of seeds.

Most of the locally developed agricultural biodiversity is now under threat and needs urgent actions to halt its privatization, modification and elimination. International and local actions are needed to counter the rapid loss of these varieties. Restrictive patents on these genes could negatively affect the food security of over 1 billion smallholder farmers in the developing world.

Much work is to be done by the governing body charged with implementation of the treaty. It remains to be seen whether governments have the will to cooperate to preserve the global commons and the genetic diversity upon which the world has come to depend.

The Anatomy of a Weed Killer Or How Glyphosate Kills Plants

By Maruja Vargas

More than 30% of all herbicides sprayed anywhere on the globe contain glyphosate—the world's bestselling weed killer.

The herbicide doesn't destroy plants directly. Glyphosate itself is only slightly toxic to plants. The chemical sets up a set of conditions that accelerates disease-causing organisms in the soil, and at the same time wipes out plant defenses against those diseases. The mechanisms are well-documented but rarely cited:

- Glyphosate acts as a chelator of vital nutrients, depriving plants of the nutrients necessary for healthy plant function,
- Glyphosate destroys beneficial soil organisms that help plants absorb nutrients and that also suppress disease-causing organisms,
- Glyphosate interferes with photosynthesis, reduces water use efficiency, shortens root systems and causes plants to release sugars, which changes the pH of the soil, and
- Glyphosate intensifies the multiplication of toxic pathogens in the soil.

Glyphosate annihilates beneficial soil organisms such as *Pseudomonas* and *Bacillus* bacteria that live around the roots. Since these beneficial bacteria facilitate the uptake of plant nutrients and suppress disease-causing organisms, their untimely deaths mean the plant gets even weaker and the pathogens multiply at accelerated rates.

In addition to weakening plants as cited above, glyphosate also *changes the makeup of the soil* and boosts the number of disease-causing organisms. The *actual* plant assassins are severe disease-causing organisms present in almost all soils not the glyphosate itself. Glyphosate dramatically promotes these severe, disease-causing organisms which in turn overrun the weakened crops with deadly infections.

Purdue University plant pathologist Dr. Don Huber tells it like it is: *"This is the herbicidal mode of action of glyphosate: (i) it increases susceptibility to disease, (ii) it suppresses natural disease controls such as beneficial organisms, and (iii) it promotes virulence of soil born pathogens at the same time."*

Based on 20 years of research and observation, Dr. Huber further states: *"There are more than 40 diseases of crop plants that are reported to increase with the use of glyphosate."*

Jeffery Smith, a scientist working in the area of genetically modified crops, has reported that the chemical glyphosate promotes the formation of certain types of fungi that are not only altering the soil profile, but have been shown to be dangerous to people and may be contaminating food and animal feed. Some of the fungi promoted by glyphosate produce dangerous toxins that can end up in food and feed. One such fungi, *Fusarium*, has been linked to medieval plague epidemics (Black Plague that killed half of the population of Europe), cancer, infertility and animal diseases.

In fact, if you ask your extension officer about using both a fungicide and a glyphosate-based herbicide concurrently, you will be advised that it is counterproductive. Likewise, Purdue pathologist, Don Huber, points out that *"If you apply certain fungicides to weeds, it destroys the herbicidal activity of glyphosate!"*

It's also possible that glyphosate is significantly altering the nutrient content of our food, through its chelating mechanism, leading to widespread mineral deficiencies in animals and humans.

Jeffery Smith further writes: *"The same nutrients that glyphosate chelates and deprives plants are also vital for human and animal health. These include iron, zinc, copper, manganese, magnesium, calcium, boron, and others. Deficiencies of these elements in our diets, alone or in combination, are known to interfere with vital enzyme systems and cause a long list of disorders and diseases..."*

A recent nutritional analysis conducted in a major laboratory in the US using GC mass spector machine in 2012 supports Smith's statement. The two corn samples used in the analysis were taken from adjoining farms. What is labeled "*the GMO field*" had continuous use of glyphosate over the previous10 years and used gmo seed. The other sample, labeled the *"non GMO field",* had not used glyphosate herbicide for the previous 5 years and used non GMO seed. The 'non GMO' corn had 437 times the amount of calcium than the 'GMO' corn: 6130 ppm compared to 14 ppm. Magnesium measured was 56 times higher in the 'non GMO' corn than the 'GMO' corn: 113 ppm compared to 2 ppm. These are the two minerals deficiencies associated with osteoporosis. The 'non GMO' corn had 7 times the amount of manganese, iron, zinc, cobalt and copper than the 'GMO' corn: 14 ppm compared to 2 ppm. The brix was 20 times higher in the 'non GMO'.

The study further points out that the corn had taken up the chemical glyphosate itself: 13 ppm as compared to 0 ppm for the 'non GMO' corn. The EPA standard for glyphosate in water is 0.7 ppm. In Europe the level is lower at 0.2 ppm. Tests show organ damage to animals at 0.1 ppm in water.

Formaldehyde was measured at 200 ppm in 'GMO' corn and 0 ppm in 'non GMO' corn. Formaldehyde is a major ingredient in embalming fluid.

With the ongoing discussion on GM crops, the topic of RR seeds, that is, those seeds resistant to the actions of glyphosate, must eventually include the consequences to the health of the soil, animals and humans fed from that soil, in the persistent use of glyphosate-based herbicide.

GM corn and GM soybeans represent a majority of Roundup®-dependent crops grown in the U.S., and this "invisible" plight of changes in soil bacteria and increased presence of fungus could indicate larger problems ahead. With so many farmers in the U.S. now dependent on glyphosate pesticides and genetically modified seeds, the implications of widespread soil fungus are tremendous as a resistant fungus could devastate farms.

The presence of newly discovered glyphosate- resistant "superweeds" is already taking a toll on farmers' crops and machinery. In reality, these "super-weeds" are resistant not to the glyphosate itself, but to the soil born pathogens, including *Fusarium* fungi that normally do the killing in glyphosate-sprayed fields.

The test data of the industrial developer of glyphosate, Monsanto, reveals that only 2% of the product breaks down after 28 days, which means it readily persists in the soil.

The implications of glyphosate-based herbicides are far reaching in any commercial farming operation, given the impact on all crops that may be planted on the treated land for many years into the future.

The chemical, which has long been touted as a safe part of global food production, is now at a crossroads. Regulators in the United States and Canada are conducting a formal review of glyphosate's safety, even as lawsuits are pending and some groups are calling for a global ban.

Branded glyphosate-based herbicides include Accord®, Rodeo®, Roundup®, Touchdown® among others.

Energetic Agriculture & Fertilizers

By Bill Lindo

Plants do not live by fertilizers, but rather from the energy they receive from fertilizers. In other words, as long as plants receive energy they will live and grow until their cycle comes to an end and they return back to dust from whence they came.

As I wrote in the March/April #20 issue of ***the Belize Ag Report***, there are three different trains of thought about agriculture -- *organic, conventional and energetic* agriculture. The approach to the use of fertilizers is a good example of the difference in thinking.

The standard for all three is to take a soil test – a Cation Exchange Capacity (CEC). The father of this standard test is the late William Albrecht, Ph.D., Emeritus Professor of Soils and Chairman of the Department of Soils at the University of Missouri's College of Agriculture. This test measures the "holding capacity" of soil and determines how much nutrient is theoretically being held by the clay and humus colloids. According to the CEC theory, clay and humus are negatively charged and "hold" positively charged minerals or soil nutrients. The procedure of the test is usually done at soil-labs using chemical solutions to extract nutrients.

Dr. Carey Reams along with Frank LaMotte developed the LaMotte test because Dr. Reams felt that the CEC test was better for long-term planning because the CEC test told the farmer what was in the soil, but not what is available to the plant for its growing. The LaMotte procedure uses solutions for nutrient extraction which are more similar to those produced by the plant roots. The best solution is for the farmer to use both tests. The lab CEC test identifies an element and its quantity in the soil; the LaMotte test tells what is available for the plant and the amounts that the plant has for its growth.

Organic Fertilizers

Organic agriculture, over 10,000 years old, is the oldest form of agriculture practiced by mankind; it was started by women who domesticated wild plants, while the men were either hunting for animals or making war on neighbors. Ancient women knew that a farmer cannot just "mind" the soil; she must replace the nutrients or elements that were removed within the plant. Manure and rock dust were applied for thousands of years on land to regenerate the soil. In the process, the farmers learned how to make compost to apply to their soils so that yields are increased, while insects and diseases are kept at bay.

Over the last fifteen years the growing of organic food has become established on a global scale, and especially in the United States where their Department of Agriculture (USDA) established standards for what and how foods can be labeled organic. One of these standards is the kind of fertilizer that may be used.

Basically, the USDA organic standard for fertilizer is that it must be natural, or is a product of nature. Yes, the plant needs nitrogen because it is essential for the construction of new cells, but not in excess. Manure gives nitrogen to the soil as 0.50% N from swine without bedding and up to 2.80% N from chicken litter. But the manure, especially after it has become compost, is 100% available to the plant and gives to the soil organic matter, bacteria feeding, and trace minerals, such as cobalt, molybdenum, titanium, and most of the other sixty plus minerals the soil needs to support healthy plants/animals and thus healthy humans.

One caution about manure: manure is soluble, meaning it's readily available to the plant, while compost is a slow release source of nutrients. Legumes such as dry beans and feather meal (from chickens) are also good sources of nitrogen, which are also slow-release sources of nutrients.

The organic sources of potassium for organic farmers are sawdust, granite dust, compost and K-mag. The organic sources for phosphates are rock phosphate and compost. But rock phosphate will remain tied-up in the soil, unless the biology is very good and active. Most of Belize's soil has a reversal of the ratio of phosphate and potassium. Therefore, this unbalanced soil needs phosphates to fix it – in slow released forms.

Organic farmers are allowed by USDA standards to use all natural sulfates in oxides or carbonate forms of magnesium, zinc, copper, iron, cobalt, selenium, molybdenum, and manganese as fertilizers to fix soil and grow crops. In fact, a friend of mine, Gary, from the US Midwest has over 1,200 acres on which he grows corn and soybeans using organic methods and fertilizers. He told me that he has his land in such good shape that if he adds no fertilizer for the use of the crop, he can get 7,000 lbs/acre from his corn, and when he puts organic fertilizers for the corn crop his yields are about 10,250 lb/acre. His neighbors who grow conventional corn with applications of over 450 lbs/acre of mixed-chemical fertilizers get about 11,800 lbs/acre, and must use huge amounts of herbicides and insecticides. Gary's organic farm uses no herbicides, nor insecticides.

Conventional Fertilizers

What we call conventional agriculture today began after World War II when the giant US chemical companies, which got started at the beginning of the twentieth century, decided that instead of dismantling their huge munitions factories they would sell their new surplus products to the farmers.

Continued on pg 23

Enhancing Quality and Relevance of the Curriculum

UB Central Farm Campus.

By G.D. Holder

The Agriculture Department of the University of Belize (UBCF) in partnership with three western Canadian community colleges, namely Lakeland, Bow Valley, and Parkland, has embarked on a project to further develop its curriculum over the next three years. The outcomes at this level include the development of teaching materials and tools, and the capacity to manage a program which will offer degrees in applied agriculture at the Associate and Baccalaureate levels. The new curriculum would be demand driven and designed to meet occupational standards of local industries and vocational standards of the Caribbean Association of National Training Agencies (CANTA).

This initiative is the institutional development component of a wider project in CARICOM funded by the Canadian International Development Agency (CIDA) and entitled CARICOM Education for Employment project (C –EFE). The project which commenced its third year on 1st April, 2013 has a total budget of $(Can) 20M and aims to develop 16 programs in the region over a five year period. The Ministry of Education Youth and Sport (MOEYS) selected agriculture as the program for Belize with UBCF as the lead institute for the development of a model curriculum as part of a seamless system of learning from secondary school to the Baccalaureate degree. When developed, the agriculture model will be used to effect the transformation of other programs at UB and throughout the country.

Total investments in this component are $(Bze)1.63M with 0.88M from CIDA, 0.47M from the three partner institutes and 0.28M from UB. Approximately $80,000 is to be invested in capital items to enhance the training environment, $240,000 for a comprehensive curriculum rewrite and the remainder for surveys, data collection and analysis, and extensive capacity building. The latter focuses on institutional management, competency based education training and assessment (CBETA), prior learning assessment and recognition (PLAR), counseling, career guidance, entrepreneurship, environmental stewardship, and gender balance. The capacity building programs would be open to selected participants from UBCF, UB, ITVETs, and the technical colleges.

The project has two other components namely, the strengthening of regional support institutions and the development of support mechanisms for enhancing employment levels among graduates. The first focuses on the further development of CANTA, with support to NTAs and the Association of Caribbean Tertiary Institutes (ACTI). The second component aims to develop labor market information (LMI) and vocational information systems to support curriculum development and enhance employment levels amongst graduates.

The project design involves the five stakeholder groups in skill based education and actively promotes linkages between education institutions within the region. Apart from UBCF, the intended beneficiaries include other programs within UB, MOEYS, and the vocational and technical institutes. The benefit to industry is greater access to a more skilled and competitive work force, thus enhancing efficiency in its operations. Training for self-employment is envisaged to be a major benefit which, if combined with timely support and interventions by the Ministry of Lands and Agriculture, could lead to the promotion of rural economic growth and development, a first and essential step towards sustained economic prosperity in the region.

Sorghum (Milo) Production Expected to Surge

Corn Substitution & Favorable Export Prospects

By Beth Roberson

Sorghum bicolor, locally known as milo, was domesticated in northern Africa where it thrives in their harsh dry climate. Other names for it are durra or msumbija (Africa), jowar (India), Samshu (N. China) and kaoliang (Arabia). World leaders in sorghum production are Nigeria 12%, India 11%, Mexico 11% and the USA 10% (2011). Worldwide production has increased 66% in the last 50 years. People have relied extensively on flour and other food products from milo in Africa, northern China, Korea and India. Haiti consumes a popular sorghum grits-like porridge known as 'pitim'. North American use is predominantly as a cattle feed. Belize usage has been mainly for livestock and that is quickly expanding into hog and chicken feeds, replacing the more costly corn.

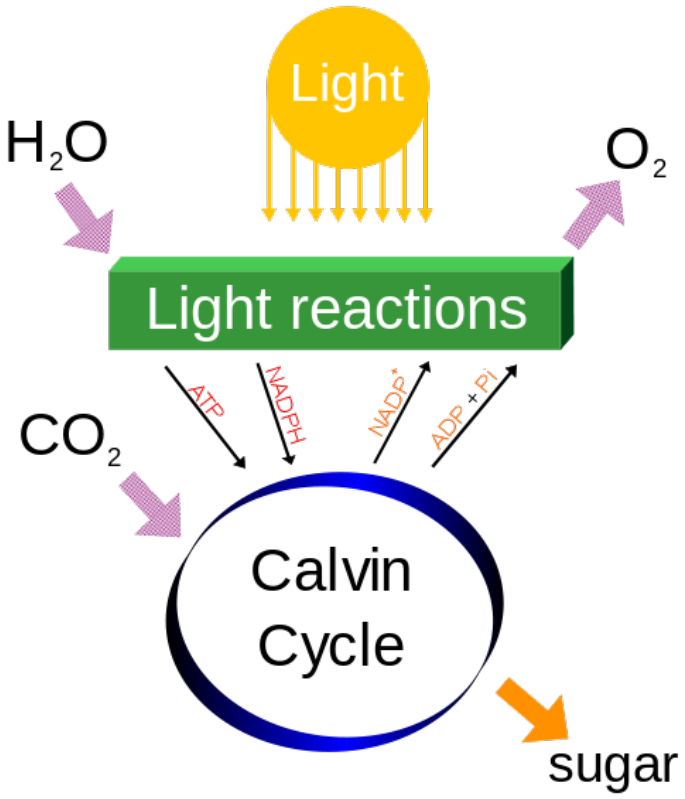
Nutritionally milo is very similar to corn. University of Wisconsin reports sorghum at slightly higher protein (avg. 9%) and fat than corn, but with a lower vitamin A content. Per pound, milo ranges from 90% to nearly 100% of corn's feeding value. Protein in both corn and milo ranges between 7 and 11 %, and both lack lysine and other amino acids. Milo's proteins and starches are more difficult for animals to digest. However, milo digestibility increases with cracking, rolling or grinding. Research to enhance digestibility is ongoing; some success has been shown with steam-flaking. Some varieties (hybrids) have been developed to discourage birds; these have higher tannins and phenolic compounds but have lower digestibility than other varieties.

In the 1970's many Belizean Mennonite farmers planted milo, but most gradually shifted to corn in the summer and beans in the winter as those had a higher profit. Milo has always been more prevalent in northern Belize, especially Shipyard, because of their lower rainfall. Around 2000, before Belize's corn export markets were as well established as now, we had a local surplus of corn, so milo cultivation began to increase. Today, due to our strong export market and, in part, to corn's high world price, local and Caribbean farmers are gravitating toward the cheaper ground sorghum in hog feed and chicken feed in place of corn. Almost all the sorghum locally used is sold ground and used mainly for chicken feed and to lesser extent hog feed. Only about 5% here is sold as whole milo. Bel-Car began exporting ground milo earlier this year to Jamaica for use in hogfeed. Guatemalans purchased it for the first time last year; they had been relatively unfamiliar with this grain. Compared to corn milo's attractive price and competitive nutrition have created new markets which are expected to continue.

Continued on page 30

Photosynthesis: Turning Sun's Energy Into Corn

By Jerry Stevens



Last year I was driving from San Antonio to my sheep ranch in Cayo District when I noticed for the first time that an area near the center of a hillside of plantains had turned yellow. I don't know why I hadn't noticed it before. The plants had certainly not turned yellow overnight. People who know these things tell me that the term for yellow plants in these circumstances is chlorosis. The plants in that area of the field did not have enough chlorophyll, the pigment that all farmers know makes plants green. I had seen similar color changes in many different kinds of plants and in different circumstance. The question was why does this happen? Obviously, the plants were not healthy. The growing season was good; plenty of rain and the other plants appeared a nice rich green indicating they had received fertilizer suggesting good care. So what was going on?

Chlorophyll is a "magic" molecule existing right in the center of what we are in the living world. By that I mean, we have animals and plants on this earth. Animals cannot live without plants but plants can live without animals. Plants cannot live without chlorophyll, which puts that green pigment in the center of the entire process. It plays a central role because of two things: it helps plants capture the sun's energy and transforms it into the chemical energy used by the plants to grow and produce everything plants produce. Because of the capture of sun's energy, it also creates a storage form of energy in products like starch, protein, and fiber we find in corn, wheat, oats, and soybeans as well as in the blades of forage grasses. The second thing it does is use atmospheric CO_2 (carbon dioxide) and water to release oxygen; photosynthesis is the major source of oxygen we breathe.

The chemistry is only confusing because of the terms and strange sounding names scientists use to talk about it. In this diagram, for instance, it clearly shows that water (H_2O) enters the plant and oxygen (O_2) is released. In addition, carbon dioxide enters the plant and sugar is released. The bar labeled "light reactions" means chlorophyll. Some strange looking letters below the bar stand for specific chemicals involved with letters indicating which direction the chemicals follow. Chlorophyll transforms light energy into chemical bonds energy (ATP). This chemical enters the Calvin cycle where the energy is used and the exhausted chemical (ADP) cycles back for recharge as ATP. The name Calvin refers to the chemists who first described the chemical cycle involved. (Actually, there were three chemists that did the work). The energy is used to attach the carbon molecules together one by one until six of them form a sugar molecule. Sugars hooked together form the starch we all recognize in a kernel of corn or a grain of wheat. The amazing thing is that what was once the sun's energy is now stored in the starch molecule. When you or your cow eat that starch, the energy it contains is turned into energy if you are working, or into fat—if you are not. That is why I said photosynthesis and chlorophyll are at the center of what we are.

Chlorophyll has a mineral at its center; that mineral is magnesium. Without magnesium, a plant cannot make chlorophyll and it turns yellow, or as some like to say, the plants become "anemic". A plant also needs zinc and iron but magnesium is of prime importance. When I drove down the road past that plantain plantation, the first thought that came to my mind was 'there probably is a small area of soil on that hillside that is deficient in magnesium'. What I did was bad science. I could have collected a soil sample and had it analyzed for magnesium and soil acidity; too much lime can cause the magnesium in the soil to bind tightly to other minerals in the soil and not be available to the plants. I thought that it might be easier to buy fertilizer with magnesium in it but found out that it is not available in Belize and to import it (magnesium oxide) is extremely expensive. It might even cost more money than the farmer could sell his increased yield of plantains. What I thought would have been bad science but to spend more on the crop then one can get in return by adding magnesium would be worse farming.

As an aside, people often talked about chlorophyll in alternative or bush medicine. The word 'chlorosis' has been used to describe anemia in people with low levels of hemoglobin, thus tying it to human health. However, there is no connection between chlorophyll and hemoglobin. They are two entirely different compounds with two entirely different functions. There is no proven benefit gained from the ingestion of chlorophyll or rubbing it on your skin or any other proposed medicinal use. Although it is a wonderful compound, its place is in cornfields and not drug stores.

From the Belize Grain Growers Association

SOYBEAN PRODUCTION SET TO TAKE OFF IN BELIZE

By Hugh O'Brien

In 2011, Belize imported 43.2 million pounds of soybean concentrate (more commonly known as soymeal) and animal feeds valued at BZ $23.6 Million. Two countries, the United States ($12.4 Million) and Mexico ($8.7 Million), supplied 89% of our feed imports and almost all of soymeal imports come from genetically modified (GM) soybean. Approximately 75% of the soymeal imported is used to make poultry feed and most of the remaining balance is used to make pig feed. With increasing population and the growing trend in Belize to eat the lower priced white meat, particularly chickens and turkeys, the demand for soymeal will continue to increase. Belize's production, or use of soymeal, is only a trickle when compared to the global scene, where the USA, Brazil and Argentina are the three dominant players both in terms of production and export.

The processing of soybeans results in the production of 85% soymeal and therefore it is estimated that Belize would need to produce just about 50 million pounds of soybean to satisfy our national demand for soymeal. Using an average yield of 2,000 pounds per acre, a minimum of 25,000 acres is required to produce the amount of soybeans needed by Belize.

According to statistics provided by the Ministry of Agriculture, soybean production in 2012 was 2.3 million pounds coming from 1,513 acres. In 2013 more acreage was planted and it is very possible that the 2013 production of soybean will be higher than the record 3.3 million pounds obtained back in 2003.

World market prices for soymeal have been fluctuating between US $465 – 560 per metric ton (or 48 – 56 cents BZ per pound) in the last few months, and this converts to a landed price ranging from 80 to 95 cents BZ per pound. The price paid to farmers by local feed mills is based on the world market price and as such Belizean farmers are getting up to 50 cents BZ per pound for soybeans.

As farmers review their production options and consider whether or not to plant soybeans, the following considerations should be kept in mind:

i. The best quality seed is from either the Caribbean Research and Development Institute (CARDI) or one of the current farmers who produce soybeans and select seed from their own fields

Continued on pg 19

Agriculture Prices at a Glance- $$$$$

May - June 2013

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

Belize Cattle	T	A	B
Young strs. & bulls- 750- 1100 lbs	H	1.75	1.65-1.75
Cows & heifers for butcher	H	1.40	(thin)1.25 - 1.40
Heifers for breeding 500-800 lbs	H	1.45	1.35 - 1.45
Young grass cattle- 350- 650 lbs	H	strs.1.60	hefers 1.45
U.S. Cattle			
U.S price -corn fed- 1000- 1200 lbs	H	1.27-US=2.54-Bz	
U.S price - feeders 600- 800 lbs	L	1.34-US=2.68-Bz	
U.S price- calves 450- 600 lbs	L	1.45-US=2.90-Bz	
U.S price- aged butcher cows	L	.80-US=1.60-Bz	
Belize Hogs			
Weaner pigs- 25-30 lbs-by the head	S	$90.00 - $100.00	
Butcher pigs 160 - 230 lbs	H	1.75 - 1.85	1.65 - 1.75
Belize Sheep			
Butcher lambs	S	2.00 - 2.25	1.75- 2.00
Mature ewes	S	1.70 - 1.75	1.60 - 1.70
Belize Chickens			
Whole sale dressed	H	2.44	
Broilers- live per lb	H	1.27	
Spent hens	H	0.95	
Fruits & Vegetables			
Tomatoes, cabbages, cucumbers	S	whosal/75-1.75-ret-$1.00-$2.50	
Local potatoes	H	.90-1.00	.80 - .90
Local onions	S	.90 - 1.00	.80 - .90

Grains, Beans & Rice	T	A	B
Belize yellow corn	S	.275	.26 - .275
White Corn	L	.275	.26 - .275
Corn/ local retail (low volume)	L	.30 - .33	.30 - .31
U.S corn @ 7.05-per 56 lb bushel	L	$25.18/ BZ 100#+8¢ frt. to BZ	
U.S soy beans-14.50per 60lb/bush	L	48.33/BZ/per100+8¢ frt. to Bz	
Guatemala corn price/Peten	S	.31 - .34	.29 - .31
Belize Soy Beans	L	.52-.53	.51 - .52
Belize milo	L	.235	.21
R-K's, little reds & blacks (beans)	H	1.50- 1.60 farm price	
Black eyed peas	L	.68- .72 farm price	
Milled retail rice per pound	S	.75- .83 farm price -distribution .93	
Citrus			
Oranges per 90 lb box-lb.solid basis	H	$10.50 Est. 2013 price	
Grapefruit- per 90 lb box	H	$ 9.5.00 Est. 2013 price	
Sugar			
White sugar- 112 lbs- controlled	S	.45 per bag + 3-5 cent mark up	
Brown sugar- 112 lbs- controlled	S	.39 per bag + 3-5 cent mark up	
Special Farm Items			
Eggs- tray of 30 eggs	S	5.60 farm- retail .25-.33 per egg	
WD Milk per lb to farmer	S	contract .50 & non contract .45	

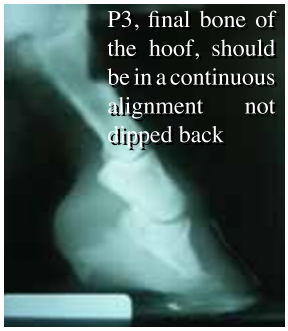
***These prices are best estimates only from our best sources and simply provide a range to assist buyers and sellers in negotiations. ***

Dear Ag Readers: The cattle sweep is moving on and the teams have completed approximately 20,000 in the Orange Walk/Corozal Districts. The Blue Creek Cattle committee had already completed approximately 19,00 head for a total of almost 40 % of the Belize herd. They expect to finish tagging , testing for TB and brucella by mid may and then move to the Cayo/BZE. Districts. The best news is that we have not had even one animal that is diseased. We see a nice bump in citrus of almost $2 a bag and the farm price for RK beans is $160 per bag. AGRICULTURE - THE FUTURE OF BELIZE - please Government, be as business and environmentally friendly as possible . Collect revenue from taxes and the sale of government property and try to cut waste where possible. It is evident that Belize is one of God's favourite places. The exciting flora, fauna, beautiful waters, tourist sites and a climate that can grow almost anything - the mercury goes through 80ºF everyday of the year. With God All Things Are Possible - All the Best John Carr

Light Rein

Laminitis/Founder

By Marjie Olson


P3, final bone of the hoof, should be in a continuous alignment not dipped back

Laminitis is a devastating hoof issue for many horses; once it has become **founder**, horses will always be foundered.

A basic explanation: within the hoof capsules lies the Pedal Bone-Coffin Bone-P3-Distal Phalanx, the final bone of the foot. It is surrounded by laminae. The laminae holds the Pedal Bone in suspension. The laminae is "live" in that it is a blood flowing part of the hoof. The way this blood works is against gravity and any compromise to the flow can cause an ischemic necrosis of the laminae resulting in pain. The more damage done to the laminae, the bigger risk of actual founder, meaning the Pedal Bone has started to shift downward, due to the laminae dying off and not being able to support the bone in its natural position.

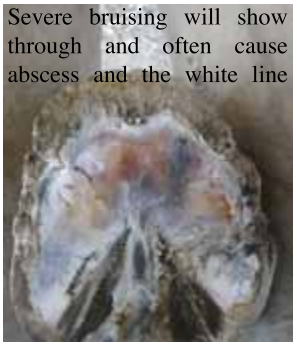
Laminitis, before rotation has occurred, can be helped and even cured but once a horse has actually foundered, the chance of recovery is much diminished. The horse can be helped and made more comfortable, but will also have the risk of foundering again and again, each time losing more of the valuable healthy laminae and causing more pain.

How do horses get laminitis? **Many** ways and often man made. The most common is carbohydrate overload: too much grain or quick change in feed without slowly mixing the feeds together, or too much grass at one time, not allowing a horse to be on pasture short periods of time to start and increasing availability slowly or even simply having the rain come and the grass grow to quickly, too rich.

Obese horses are prone to laminitis/founder. And grass and grain intake needs to be drastically reduced to even a point of none. It may seem mean to take grain away from a horse who enjoys it so much, but it can kill them in the end if not decreased to a handful.

Road founder means a horse has worked too hard on hard ground and the concussion was just too much for his hooves to handle. Founder may be brought on by illness as well, often following sleeping sickness, colic, influenza or flu.

When the flora in the gut gets devastated, it creates a bloom of lactic acid-producing bacteria. Once the gut becomes acidic a destruction of gram negative bacteria occurs. Once this destruction happens, endotoxins are released and the lactic acid damages the intestinal mucosa and allows absorption of an increased amount of lactic acid and endotoxins into the portal circulation.


Severe bruising will show through and often cause abscess and the white line

How do you know your horse is foundering or starting with laminitis? He will be rocking back on his hind limbs and trying to take pressure/ weight off his front hooves. At this point you have a serious problem already started. He may walk stiff legged in front and not want to move at all. If your horse seems unusually "ouchy" on gravel or hard ground or he is prone suddenly to abscesses, lays down more than usual, you may be leading up to founder and be in the early stages of laminitis.

If you have a suspicion of laminitis, do not grain and get the horse off grass, but, onto soft ground.

Preventing the endotoxins that are released during an episode is very important and mineral oil, aspirin, bute, banamine, ace, even intravenous fluids can be of help. Once foundered, corrective shoeing, such as with a heart bar or combi pad shoe is also recommended. If shoes are not available keeping the horse in a sand paddock is helpful as it can help stabilize the hoof. Corticosteroids should be avoided in all cases of laminitis.

Radiographs are very helpful once a horse is foundered as it will help tell you to what degree of rotation you are dealing with. But radiographs need to be done correctly and with a metal marker on the anterior hoof wall and a metal tack at the apex of the frog.

If a horse has truly foundered you will deal with abscesses that are extremely painful for the horse and need to be treated to prevent a further infection or tetanus. Abscesses can take weeks to finally break out and leave a foot a damaged mess for months to come. A resection is at times necessary, but dangerous in its own right.


Excessive heel growth and contraction may also develop as you can see on left front foot

A foundered horse will show signs in the hoof wall after an episode has occurred. There will be a ring that widens as it flows to the heel area. And often the heels will contract and create a club footed look to the hoof; furthermore, if you see several rings widening towards the heel, stay away from the purchase if that foundered horse is for sale.

The best thing you can do for founder is to prevent it from happening...

Have a wonderful summer and remember you can always contact me with questions at Shotsy08@live.com

"Never sell your saddle, cuz life's a long, long ride..."

Soybean... Continued from pg 15

ii. In the Cayo area, planting soybeans in the November/December cycle is less risky than in the June/July planting cycle due to higher probability of rainfall during harvesting time. In the north of the country, it is advisable to plant in the June/July cycle as there may not be adequate rainfall for a November/December planting.

iii. A rotation of corn in one season, followed by soybean in the next season allows for another option to rotate corn with a nitrogen fixing legume. Currently rotation of corn is done mostly with red-kidney beans and blackeye peas.

iv. The main cost items are weed and insect control (30%), seeds and fertilizers (22%) and land preparation (17%) and attempts should be made to maximize the returns from these inputs through proper placement and timing.

v. Expansion of soybean in the past was restricted by farmers' inability to control soybean rust disease. Thanks to CARDI, farmers have a better understanding of how soybean rust affects the plant, and are able to get better results by applying fungicide sprays on a more timely basis and based on the prevailing weather.

vi. When soybean prices are low, the break-even yield (ie. the yield that a farmer starts to lose or make money) is around 1800 lbs/acre. When soybean prices are high as they are now, the break-even yield is lower than 1500 lbs/acre. Increase productivity or yield per acre is a key factor that determines whether a farmer makes or loses money.

Increasing the acreage of soybean does not mean that additional area has to be cleared and brought into production as soybeans can be planted on the same land that corn is currently planted on, except in the November/December planting cycle. Apart from the technical benefits of improving soil fertility and providing a new crop option to farmers, soybean production has the potential to reduce our import bill, conserve much needed foreign exchange and diversify our economy. In a time when new investments are lacking, the Ministry of Agriculture and the Government of Belize would welcome good news on the future of soybean production.

Notice to Readers of the Printed Issues:

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Moving Forward to Grasp Livestock Opportunities

By Beth Roberson

Belize Ag Report writers visited with Dr. Muhammad Ibrhahim to discuss the Belizean livestock industry. Dr. Ibrahim was appointed IICA (Instituto Interamericano de Cooperation para la Agricultura) Country Director in November 2012. A Guyanese native, Dr. Ibrahim received his PhD degree at Wageningen Agriculture University in the Netherlands, prior to his 25 years with CATIE (Centro Agronomic de Investigacion y Ensenenza) in Costa Rica, where he headed CATIE's Livestock and Environmental Program. During his time with CATIE, he participated in programs in all the Meso-American countries, including Belize. This article is a direct reflection of that enlightening visit.

With world demand for beef projected to grow 3 to 4 % annually in the foreseeable future, how can production be increased in Belize without damaging our environment? Can responsible sustainable livestock ranches, in fact, capture more carbon than is created during beef production? Can these ranches then become a part of the world's environment protection solution? These are issues which Dr. Ibrahim ponders. He feels certain that there are many viable options for both large and small Belizean ranchers, which can contribute to solving and avoiding environmental problems and also improve ranchers' bottom lines.

With plentiful arable land, good water and our low population density (15.11 persons/sq. km.), Belize is in prime position for ecological intensification of cattle production to capitalize on growing regional and international markets. Loss of prime agricultural land by conversion to tourism and residential and industrial use is happening in some of the other Central American countries, especially Costa Rica (for example, Guanacaste region). Belize is not at that crossroads currently, but it may become a consideration for us in the future.

History of Cattle Production in Central America

From the 1970's to 2000, demands for cheap U.S. beef resulted in the large scale deforestation and pasture expansion in Central America which was fostered by inappropriate government policies and loans from international donor agencies. Brazil in particular has borne much criticism for its clearing and exploitation of the Amazon. The livestock industries are also heavily blamed for contributing to global warming, especially because of the emissions of methane and nitrous oxide gases produced by livestock, and because of losses in carbon stocks attributed to land use changes. There are new trends for environmentally conscious livestock products, and experts believe that productivity of existing systems can be increased, and the environment can be simultaneously protected, creating a win-win situation for an expanding beef industry. Here are some of the paths which Belizean producers may explore to increase carrying capacity and increase yield and income.

Address the present 'bulldoze it all' mentality and also **diminish or stop use of fragile hill systems** for pasture**.** Eco-intensification, holistic farming such as moving to **silvo-pastoral systems**, whereby trees are both planted on their own, (e.g., Leuceana at 3000 trees/acre), combinations of grasses and forage trees together or several tree species (Leuceana & Ramon) together. A concerted move away from mono-culture pasture practices to diverse silvo-pastoral systems, can improve many aspects, including profits via increase in pounds/animal/acre, and the health of the environment.

Increase use of live fences and hedges, and adopt more efficient animal rotation systems. Just over the border, Guatemala's Peten has seen a drastic level of agricultural development in the last 30 years. A drive from Belize's western border to Flores is a vista of one ranch after another with a few villages interspersed. Nearly all the fence lines utilize living fence posts – Madre Cacao, Ramon, Jatropha; about 100 plant types are used as hedges/fence posts in Central America. Many of these are or can be available to ranchers in Belize. Diligent management of fence lines and timely rotations of small pastures with Mombasa grass allows Running W Farm, next to Central Farm in the lush Belize River Valley to maintain 1200 head on just 600 acres, with hay supplementation only in the dry season. They report that their intensely monitored rotation system has also reduced their need (and costs and pollution) for bush hogging, increasing profits.

Currently, there are **no pasture seed producers in country**. CARDI is involved with the production of grain, soya and pepper seeds and can be involved in providing training to farmers on seed production for forage species. Just a few decades ago, before reliance on imported seeds (mainly Brazilian Matsuda) predominated, several farmers made good money collecting grass seeds for sale. For example, Blue Buffel seeds were collected and sold by the Swingle family of Barton Creek, in the 1970's. Dr. Ibrahim feels this may be a lucrative overlooked business opportunity. An investment of between $50-$70,000 BZ wisely used might set up a seed production facility that could offer seeds better suited to our local environment and at lower costs too! A return to running more local trials of grass varieties, to identify the best varieties for us might be prudent now.

Improve the genetic stock with artificial insemination (A.I.) or other methods to produce high quality animals, to small and medium sized farmers. The larger farmers here, especially dairy, are already using A.I. Some of the leading local beef producers are also taking advantage of A.I. In the 1990's Central Farm ran an A.I. center. We need to explore how to address this challenge to reach the small and medium sized farmers with options to upgrade their herds with A.I. or a bull-loaning service or a program yet to be developed. The newly implemented cattle sweep places Belize in position to legally export tested and traceable live cattle. The national herd, overall, is not now at the quality level to take advantage of this export opportunity. Every farmer would be well advised to seek ways to improve his herd so he can take advantage of this more lucrative marketing opportunity for his/her beef.

Niche Market Opportunities

Many regions /countries have an existing certifying board for their meat products. The Rainforest Alliance is active in many Central American countries; Brazil, Honduras and Costa Rica all have systems, either currently implemented or planned, to identify and certify beef which has been produced in an environmentally friendly manner. Certified beef receives a premium price.

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Livestock Opportunities...Continued from page 20

Wall-Mart in Guatemala sells certified "sustainable" beef and burgers of buffalo meat, and Costa Rica is in the process of developing standards for certification of "low carbon" and "low emission beef". We in Belize may elect a different marketing path from our neighbors, yet it is wise to be aware of what is happening in the world industry as well as in our Central American back yard. Predictions are that the world's international financing and grant/loan agencies will be re-focusing on agriculture, as food security moves up on everyone's agenda. According to the Food and Agriculture Organization (FAO) world beef production is anticipated to double by 2050. Our actions now in Belize will determine to what extent we will share in that expansion. In Costa Rica cattle farmers have adopted improved silvo-pastoral technologies which have benefitted them with increased income resulting from the sale of cattle and environmental services including carbon, biodiversity and water; Belize can adapt a similar pathway.

The Wonders of Pineapple

By Dottie Feucht

The next time you have iced tea try putting a slice of pineapple in it for sweetening. The area closer to the base of the fruit has more sugar content and therefore a sweeter taste and more tender texture. Not only will the pineapple give the tea a delicious flavor, it will aid your digestion because of the bromelain it contains.

Bromelain is a complex mixture of substances including a group of protein-digesting enzymes called cysteine proteinases. The bromelain of the fruit is not as rich a source as that found in the core and stem which is usually extracted and made into a dietary supplement. Research studies have shown that bromelain taken as a dietary supplement reduces inflammation, heartburn, upset stomach, excessive coagulation of the blood, and certain types of tumor growth.

You don't have to take bromelain as a dietary supplement to benefit from pineapple. Even fresh pineapple has wonderful health benefits. There are 80 nutrients listed on one health food-related web site for pineapple. It is rich in Vitamin C, the body's primary water-soluble antioxidant, defending it against free radicals that attack and damage normal cells. Free radicals have been shown to promote the artery plaque build-up of atherosclerosis and diabetic heart disease, cause the airway spasm that leads to asthma attacks, damage the cells of the colon so they become colon cancer cells, and contribute to the joint pain and disability seen in osteoarthritis and rheumatoid arthritis.

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Western Dairies – A Pioneering Enterprise

By Dottie Feucht

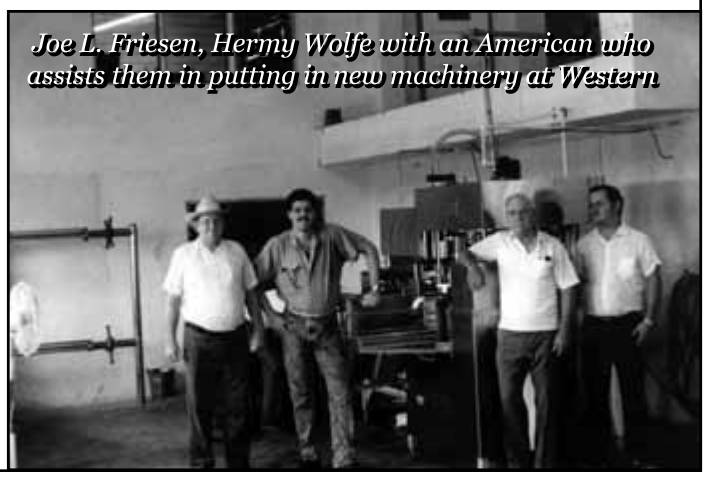
Western Dairies, a co-op known all over Belize for its dairy products, was founded by 16 farmers and business men in 1967 in two wooden buildings, about 30`x 48` in the heart of Spanish Lookout. It was not easy to establish the dairy. There was no electricity and most of the equipment was used, creating many maintenance problems, which were solved by the hard work of the board members themselves. For example ice water is needed to cool pasteurized milk to 38 degrees Fahrenheit. When the ice builder machine malfunctioned someone had to hurry to San Ignacio to buy ice and if a local repair could not be done, it was necessary to call a refrigerator man from Orange Walk. In the '60s that was a major trip! A boiler was needed to heat the milk. But obtaining a satisfactory boiler wasn't easy either (see *Pioneer Years in Belize* pages 92-94). An old locomotive boiler was finally purchased from the government of Belize but it was on top of an 800-ft. high hill and presented a formidable task to transport it to Spanish Lookout. The boiler is actually a steel water tank with tubes installed horizontally from one end to the other. Water flows all around the tubes and hot air, fired by wood, travels in the tubes from one end to the other and out the chimney. The water in the tank turns into steam and with it the pasteurizer is heated. To get enough dry fire wood and to fire the boiler every morning was quite a job. Later a small kerosene-fired boiler was bought. But leaking pipes were a constant problem and had to be replaced with new ones. A new, modern boiler was bought in the eighties which solved most of the problems. This one served until 2002 when it was replaced with a bigger one.

The first milk-packing machine, like the other equipment, was an old machine and caused a lot of headache to get it going and keep it going. In a couple of years a more modern machine was set up. In the late 80's a brand new "NIMCO" packing machine was bought. Even though it gave less trouble it had one continuing problem: leaking cartons, which created an occasional big mess in the milk storage room and in merchants' coolers! Nevertheless, this machine served until 2003 when it was replaced with a 12-head straight-line bottle filler.

The first deliveries were made in a 1959 half-ton Chevy for $22.50 a trip to Belize City. Around 1969 a small 6-wheel truck with a custom-built caboose-type box on it was used for hauling both milk and passengers. In 1981 Western Dairies bought their first new Mazda truck with an insulated van box from Costa Rica. This made it possible to do more deliveries in town and the sales went up. The cooling system of the first trucks had ice plates inside the box, operated by an electric motor which had to be plugged in to the current in the home of the driver. The next morning the plate was very cold and stayed icy till about noon. Delivery trucks that were bought later had a cooling system driven by a gas motor. This made it possible to keep the milk cool all day long.

In 1977 the first addition to the facility, cold storage rooms, was one of the first buildings of poured concrete in Spanish Lookout. Material to make the cement forms was brought in from Mexico. About seven years later, being in great need of more space, WD built a complete building with a second floor over the old wooden one. After the main wall and roof were there, the old building was broken down and carried out piece by piece. During all this mess, the plant had to operate every day. With several more additions during the following years WD now has a floor space of 17,850 sq ft. including the retail/restaurant facility adjoining the plant.

The electric power system in Spanish Lookout today is a direct expansion of the power system required and established by WD. The first generator was a used one, imported in the early seventies from the U.S. It, too, was troublesome. After that first one only new sets were purchased. As neighbors saw an opportunity to obtain electricity 24 hrs. a day, they hooked up to WD's current. Soon WD installed electric lines all over Spanish Lookout to supply farmers with current. For many years the electricity business was a big help to Western Dairies; often the net income from electricity sales was more than from milk sales. Since 2002 the milk and electricity departments have become two separate businesses: Western Dairies and Farmers Light Plant Corporation.



Joe L. Friesen, Hermy Wolfe with an American who assists them in putting in new machinery at Western

Energetic Agriculture...Continued from pg 11

To make this new business model work, the giant companies started to donate "grants" to different land-grant universities for so-called "research" and campus buildings. By the middle of the 1950's close to 85% of US farmers were "hooked" on the NPK concept and by the early 1990's over 90% of farmers world-wide got "hooked" as well. This new business model concept of NPK sees farming as nitrogen, phosphates, and potassium. Over the last few years, a few of what are called "micro-nutrients" such as manganese, iron, and boron were included by conventional agronomists for vegetable and other-high-valued crops, such as, fruits and flowers. However, the main emphasis is still on NPK and its necessary rescue chemicals.

Take our Belize as an example; we use urea which is a form of ammonia fertilizer for our entire crop growing, such as corn, coconuts, vegetables, oranges, sugar cane, soybeans, and dry beans. One of the consequences of heavy ammoniacal-nitrogen is its breakdown into nitrate-nitrogen which is a major cause of soil acidification and the loss of nitrates through leeching. Dr. Carey Reams' research has shown that once a farmer exceeds 40lbs/acre of either nitrate or ammonical forms of nitrogen, the farmer is actually shutting down the natural microbial response which produces free nitrogen. The farmer must not forget that our Creator has blessed us with the air we breathe containing over 80% as nitrogen. This should be the farmer's main source of nitrogen, and it is *free*.

And for our phosphate needs here in Belize we generally use triple super phosphate. For potassium, potassium chloride. One way we measure or determine which fertilizer to use is to look at the salt index of the fertilizer. A good rule is to use only those whose index is below 75. Common table salt has an index of 154; potassium chloride's index is 116; ammonium nitrate is 105; while urea is 75, or border-line. The better fertilizers such as potassium sulfate 0-0-50, have a salt index of 46; calcium nitrate is 53. A good ammonium source, ammonium sulfate 21-0-0+24 (S) (i.e., 24% sulfur), with a salt index of 69, is good for Belize with its high pH and high calcium soils, as this fertilizer will reduce both.

Then there is the deadly but cheap potassium chloride. At first, it makes plant grow like crazy, but after a few years, the chloride takes its toll on the soil, killing all living things in the soil. And as for triple super phosphate, it's just a waste of time to apply it to soils. Within 30 to 90 days, which is the usual growing season, this form of phosphate will combine first with calcium, and later with manganese, zinc, iron, and the rest of minerals in the soil to compounds from which the plant roots will never receive any energy.

Energetic Agriculture & Fertilizers

One of the differences between organic farming and energetic farming is in the use of fertilizers. Energetic farms will use any fertilizer – organic or inorganic as long as it does not hurt the soil and its micro-organisms and gives off good energy levels. Energetic farming goal is to maximize the use of the energy content of the fertilizer so that plants grow fast, give good yields, are healthy, and provide nutrient-dense foods for healthy animals and human beings.

Another way to look at fertilizers is to take electronic scanner readings. By testing different fertilizers, seeds, and soils, the farmer may then build a program that matches his inputs and increase the energy content of his plants to fight insects and weeds. A few years ago, a scanner test of fertilizers was done in South Florida. The numbers in the chart represent the energy content of hybrid corn resulting from application of the fertilizers listed. The chart also shows the effects on two types of weeds, quack grass and velvet leaf, and on the earworm insect.

Product Tested	*Quack Grass*	*Velvet leaf*	*Earworm Insect*	*Corn, Hybrid*
Vitality	130	470	320	450
46-0-0, Urea	140	180	200	540
21-0-0-24S, Amm Sulfate	20	40	30	630
Anhydrous, Nitrogen	270	820	510	190
Soft Rock Phosphate	0	10	0	4600
11-52-0, MAP	170	60	10	630
0-46-0, Trip Sup Phosphate	110	360	80	250
0-0-60, Potassium Chloride	70	740	640	120
0-0-50, Potassium Sulfate	50	300	60	600
Dolomite Lime	230	100	300	1000
Hi Cal Lime	0	0	40	3100

The table above can help the farmer decide which fertilizers to use. Let's look at two sources of nitrogen – urea and ammonium sulfate. The ammonium sulfate is a better source of ammonia-nitrogen because it gives a higher vitality reading, 630 versus 540. And it is lower for both types of weeds, 20 and 40 versus 140 and 180, respectively, and much lower for the worst insect of corn in Belize, 30 versus 200.

If we now look at the phosphates, we see that MAP is better than triple super phosphate because the latter will actually increase the threat of weeds and earworm insect problems, while its vitality is low at 250 compared to 630 for MAP. But the soft rock phosphate is clearly superior. Soft rock phosphate will keep weeds and corn earworm under control, while it gives tremendous energy to the corn seed with a reading of some 4,600.

Comparing the potassium compounds of chloride and sulfate we see again the huge difference, as the sulfates form of potassium is vastly superior to the cheap but very dangerous potassium chloride. The 0-0-60 of potassium chloride is the main reason why Belizean corn farmers must use herbicides and all kinds of dangerous insecticides to handle the corn earworms. *Look at the table!* The vitality reading for the corn hybrid using potassium chloride is 120, while the readings for the quack-grass weed is 70, for velvet weed is 740 and for the corn earworm is 640! In other words, the use of potassium chloride on corn is an invitation for the corn earworm. And even if you plant Bt Corn (GMO Corn) you will still have this problem after a few years. Ask the corn farmers of the United States. The problem is in the soils which are dead from using a wrong fertilizer. Simply changing your potassium fertilizer to a sulfate form (depending on soil conditions) will solve your weed, insect and energy problem in the growth of corn in Belize.

Some parts of Belize have very acidic soils and therefore need lime to fix its soil and also reduce the pH. The above table shows that high calcium lime is much better to the biology of the farmer's soil than dolomite lime.

One last word on fertilizers and the soil: after the CEC soil test is done it will show what compound is missing or in short supply. In the Cayo and Belize Districts the soils all seem to have huge amounts of calcium and magnesium, while potassium and phosphates are in very short supply and generally out of balance. The solution is to fix the balance over say three or four years by adding the fertilizer that's short or out of balance. It costs money to fix soils, and like the stomach of a "baby" the soil needs a little at a time. But the farmer must also add fertilizers for the current crop he is growing in the correct amount and at the right time. The current habit of applying all the needs of the plant at planting is not correct and is a waste of money.

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Apples of Belize

Star Apple

By Mary Susan Loan of Cristo Rey Village, Cayo

Most of the apples in this series "Apples of Belize" are not botanically classified as apples; however, they are commonly known and considered to be apples in Belize and other tropical countries around the world.

The star apple tree, *Chrysophyllum cainito,* produces a fruit which is commonly known throughout the world as caimito; other names include cainito, star apple, golden leaf tree, abiaba, pomme du lait, milk fruit and aguay. The star apple is considered a minor fruit of the Sapotaceae family. The star apple is native to the West Indies and the lowlands of Central America. It has become naturalized in Haiti and many islands of the Caribbean and as far south as northern Peru and is also cultivated in Africa, Australia and the Philippines where star apples are a common roadside tree. Star apple trees are intolerant of cold temperatures, but thrive in tropical settings.

The star apple tree is an erect tree with a short trunk and grows from twenty-five to approximately fifty feet tall. The branches are brown and hairy and exude a gummy white latex substance. The glossy dark green evergreen leaves of the tree are from three to seven inches long and two inches wide. The underside of the leaves shines with a golden color in the sun. The attractive tree is sometimes grown as an ornamental due to the dense foliage with velvety, coppery-golden undersides and the tiny purplish-white, fragrant flowers that are visible prior to the fruiting of the tree.

Star apple fruits are generally round, but can be oblate, ellipsoid or slightly pear-shaped and grow to be from two to four inches in diameter and resemble and feel like a rubber ball. The fruits are either purple or greenish-brown or, from a less common variety, yellow. All varieties produce fruits with an attractive star pattern in the flesh of the fruit which radiates from the central core. About a third of the skin and rind is inedible. It is advised to eat the fruit only when it is fully ripe for the best flavor and to avoid having your lips shut with the glue like latex by the sap in the rind. The fruit taste when ripe is sweet with a slightly translucent mucilaginous and jelly-like texture. Beware, never bite into a star apple! The unripe fruits are gummy, astringent and inedible. In Jamaica the ripe flesh is eaten with sour-orange juice, a combination known as 'holy matrimony'. The fruit of the star apple is usually eaten raw from the rind from a fruit halved by a sharp knife. Star apples may be combined with many tropical fruits to enhance presentation and taste. A tasty dessert may be enjoyed by combining star apple slices with orange juice, sugar, a splash of sherry and grated nutmeg. The pulp can be frozen or used fresh in fruit smoothies or as a fresh fruit sauce.

Star apple trees are easy to grow and are most commonly grown from seeds to bear fruit in five to ten years. The three to ten seeds of each fruit are brown and are approximately three quarters of an inch long and may be started in plastic black growing bags or pots and replanted when at least one foot high. Cuttings of mature wood root well and air-layers can be grown for planting in four to seven months and are capable of fruiting one year after being planted. Harvesting star apples can be challenging as the fruits do not fall from the tree when ripe, but must be hand-harvested by clipping the stem, which becomes even trickier when the tree is fully grown and from twenty-five to fifty feet tall! When fully ripe, the skin appears dull, slightly wrinkled and slightly soft to the touch. A small ring of green around the stem approximately the width of a thumbnail is also an indicator of ripeness. Star apple trees are not particular about soil as long as there is good drainage and generally do not require fertilizer. A well balanced fertilizer will increase yield on trees grown in limestone or other infertile soils. Star apple trees are most productive from February through May. Fruit bats and fruit flies are the major pests of the star apple tree; otherwise the tree is quite hardy.

Wood from the star apple tree, while not durable for outdoor use, is used for deluxe indoor furniture as the pinkish to red-brown or purplish colored wood is beautiful and easy to work with.

The fruit of the star apple has anti-oxidant properties and is used as a treatment for laryngitis and pneumonia. The leaves are used as a treatment for diabetes and rheumatism. The bark is considered a tonic and stimulant. A decoction of the bark is used as an antitussive. The bitter tasting seeds are ground and used as a treatment for dysentery and as a vermifuge (expels worms).

Star apples trees are vigorous growers and are capable of high production of fruits whose tough skin makes transport easy. Despite the ease of growing star apples and the durability and long 'shelf life', star fruits are not commonly available in the Cayo farmers' market. If you are fond of star apples buy a tree from your local nursery. In the event star apple trees are not available at your favorite local nursery, All Fruit Nursery in Springfield, Belize sells star apple trees all year-long.

Questions and comments welcome: loanmarysusan@gmail.com

Litchi Cultivation

By Gary Tulloch, Hill Bank Farms

Propagation: The most widely used method of litchi propagation is air layering, however litchis may also be propagated from seeds, grafting or cuttings. If propagating from seed, the seed must be maintained in moist sphagnum moss; otherwise the seed begins to shrivel within 24 hours and in 5 days is no longer capable of germinating. The seed must be sown horizontally at a depth of 1 to 2.5 cm in a well-drained sowing medium in a partly shaded, well irrigated location. The sowing medium should be either peat, or various mixtures of sand, peat, vermiculite, soil and compost.

Germination should occur within 3 days. Thereafter, when the plant has reached a height of 10 to 15 cm. it should be transplanted into a bag. The plant should remain in the bag until a subsequent vegetative flush has occurred. Plants propagated from seeds do not reproduce the characteristics of the parent plant. Also, they are extremely slow to bear fruit.

The purpose of propagation by grafting is to introduce one cultivar of litchi (the new cultivar) to a different cultivar (the existing tree). The new cultivar is usually from seed stock which is approximately 9 months old. The grafting may be done by any of the three traditional methods: the splice approach, the tongue approach or the inlay approach.

There are two problems with the grafting method. First, if the new cultivar is not available locally, then it must be imported. Secondly, the litchi is a plant that does not graft easily. This is due to the fact that in a mature plant, only about a third of the cambium is active at any one time. A successful graft will occur only if made in this active area. Therefore chances are two out of three the graft will fail; nevertheless, there are advantages of employing the grafting method. If the graft is successful, the existing tree already has a well-established root system, and new cultivar will commence fruit production earlier. However, due to the difficulties in obtaining a successful grafting this method is not used on a commercial basis.

Litchis can also be propagated from cuttings. However this method of propagation involves some considerable expense. A misting system is required; the temperature below the propagation bed must be maintained at 30 to 32 degrees C (86 to 89.6 F). Furthermore, the plants from cuttings are generally weaker and the root system is usually less developed than plants propagated by air layers. Mostly propagation from cuttings is done for experimental purposes, but not commercially.

Air layering is by far the most widely used method of propagating litchi plants. Its advantages are that it is inexpensive, easy to use, a genetically identical plant is produced and harm to the parent tree is insignificant. Air layering in Belize should be commenced during the rainy season. The first step in air layering is to remove from a branch a strip of bark and cambial layer approximately 1.5 to 2.5 cm in length. This exposed part of the branch and the area immediately above and below it are then packed in moist litchi soil or moist sphagnum or peat. The pack material is held in place by clear plastic which is tied off at either end.

In approximately 6 weeks white roots appear. Thereafter once the white roots have changed color to a creamy brown the branch is cut from the tree. The plastic is removed and the air layer is planted in a bag. Any existing leaves on the branch are removed. The plant is then maintained in a nursery under a shade cloth.

Litchi Grove at Hill Bank Farms

Soon new leaves begin to appear and when they turned dark green you have a successful air layer.

Care and Maintenance: Litchi is not very demanding with respect to soil. Trees will grow adequately in soils as shallow as 40 cm. They can adapt to sandy, loamy, clayey-sand, clayey-loam, and even soils with 40 % clay. One thing they cannot tolerate is white marl. While the tree will live in soil containing marl, the leaves will turn yellow and it will not bear fruit. Many experts recommend planting in well drained areas. However litchi trees can withstand up to two weeks of flooding.

Mature Litchi trees are quite drought resistant. In fact, litchi fruit is one of the world's most drought-resistant fruits. However the immature litchi tree, under 5 years old, requires irrigation during the dry season in Belize.

Fowl manure should be applied to immature and adult trees twice a year during the rainy season. For the mature trees an application of three pounds of low nitrogen fertilizer (either 10-26-26 or 14-36-12) should be applied in October. The recommended method is to apply all the fertilizer at the drip line, but only one half the way around the tree. At the time of applying the fertilizer, it is also recommended that the tree trunk be struck soundly 5 times with a hammer, approximately one hand span above the base of the trunk. The reasoning for the hammering is as follows: the hammering causes a wound to the trunk, the tree calls up sap to heal the wound; however the rising sap does not stop at the site of the wound but continues to rise throughout the tree, thus resulting more new growth and flowering.

The litchi, which originated in China and South East Asia, is now grown in many countries throughout the world. The time for flowering and fruiting varies according to location. In Belize flowering commences in December and continues until February. The fruit is harvested from mid-April until early June. The ideal weather condition for flowering is 200 cumulative hours of temperature at or below 16 C or 60.8 F.

Source: *Litchi Cultivation* By Victor Galan Sauco, 1989

Response ... Letter to the Editor **Continued from page 5**

You should have said "all physical life is chemical and is energy" according to Einstein. It just has to move at the speed of life squared. Your statement from Dr. Reams describing cations and anions from an "electrical point of view...not wet chemistry", is not correct. Wet chemistry refers to a broad class of test techniques in the laboratory some of which have been adapted for field testing.

You stated that Dr. Reams asked if calcium can carry a charge; the answer is yes. Calcium like all elements carry charges, but they are electrically neutral. Elements through ionization lose or gain charge (electrons) according to an electrochemical series in order to create ions or charged species. The example relevant to your statement is that loss of 2 electrons (negatives) creates a more positive species hence calcium becomes Ca+2 (a cation) and gaining of an electron creates a charged particle known as an anion, hence Cloride-1. You seem confused between chlorine and chloride. Your statement that the "water company only uses two ppm of chloride" is way off. Chlorine (a gas) is the element that is a diatomic molecule composed of two chloride atoms as a standard state molecule. Hypochlorite is the highest reactive oxidizing state and carrier form for chlorine, the element, for water sanitation. Chloride, on the other hand, is that ion of chlorine (the element) which can combine or is available for the exchange with another molecule such as potassium, your favorite target. Chlorine can be produced from the mixing of a strong acid such as sulfuric acid with bleach, otherwise known as hypochlorite, or else by electrolysis of table salt NaCl to produce hypochlorite. The point is, these reactions cannot and do not happen in the soil. Lightning may create insignificant amounts when the bolt charge hits the earth. No vegetative produce of the earth contains chlorine gas or the oxidizing versions but rather plants and their produce are widely regarded as having anti-oxidants.

You are so quick to condemn "conventional" agriculture and the institutions of learning. You may also be surprised to learn that "conventional" agronomists do not exist since an agronomist by training uses a mixture of conventional and non-conventional techniques in research and production. This is true for "organic", mineral nutrient fertilization or any other type of farming you can name. You see, agronomists use a scientific and statistical methodology but otherwise do think and act outside of the schools for the "high priests" and the corporate doctrines.

On line 20 under "Growing Crops Without Rescue Chemicals" you state that at least 80 elements of the periodic table are needed to promote good health. However if you do the arithmetic, Mendeleyev's Periodic Table of 118 reduces to 22 that are needed and useful. (22 is obtained by deleting the 28 lanthanides and actinides, the 54 located on the lines starting with rubidium, cesium and francium, 4 noble gases, lithium, beryllium, gallium, germanium, yttrium and others) It is known that some plants can extract certain non-nutrient and non-toxic/toxic metals from the soil, but these are not needed by the plant.You would be interested to know that gold is one of them. The schools of agriculture teach that the primary nutrient elements, N,P,K, the secondary ones, calcium, magnesium and sulphur, as well as the trace elements, boron, chromium, iron, cobalt, copper, zinc, silicon and others are all that are necessary for certain crops. I will ignore the interrelationships between those elements as they are very complex and require a treatise to explain.

Finally, you claim that "Belize has seen a dramatic increase in degenerative diseases.....is there any wonder why we, as a nation, are so sick". Again where is your proof? Even Colin bh's "Growing Up in Old Belize" does not provide anecdotal evidence to prop you up. Finally, please do not recommend bans for Muriate of Potash or Anhydrous Ammonia fertilizers or else you may end up like the ancient popes dishing out Copernican punishments. I am awaiting your proofs.

Sincerely

Harold Vernon (hmvernn@yahoo.com)

Response to GMO Technology Fear or Future? (Issue 21, page 5)

Dear Editor,

As one of the Administrators of the social network Facebook group ***Belizeans Against GMOs*** (BAGMO), I express our collective noted concern that people are being seriously misled and intentionally confused about GMOs by (noted) individuals who use the public arena to knowingly and intentionally spread false and inaccurate information about that which they are either biased or are being paid to promote. I will personally note Mr. Louis Wade of Plus TV, using his show as a platform to express his very biased and intentionally-misleading perspective of the GMO issue. And I speak of Mr. Hugh O'Brien, whose GMO article in your last issue was misleading, confusing, and filled with mistruths.

We know Mr. John Carr and Mr. Frank Redmond are among the founders of the new Belize Grain Growers Association, organized in an effort to collectively request Government of Belize to establish the protocols needed for the importation of GMO corn. We know this group has hired Mr. Hugh O'Brien to be their lobbyist... their spokesperson. And now we see Mr. Hugh O'Brien, speaking as a scientist, intentionally confusing mutations with GMOs in an article he wrote and presented to the Ag Report (see last issue). We know that Mr. Hugh O'Brien is a trained scientist. Having the education of a scientist puts one in a category whereby people expect one to be more knowledgeable, more credible, and most professional than someone who isn't as educated. Speaking for myself, it disturbs me deeply when I see educated people speaking something OTHER than what they KNOW to be the truth.

Belizeans need to wipe out their eyes and ears... and understand that most spokespersons are being PAID to do a job. In the case of Mr. O'Brien, his job is to serve the people who sign his paycheck, the members of the Belize Grain Growers Association, by convincing the GOB that GMO corn is a good thing for Belize. His primary 'field of visual' now finds him looking down a narrow tunnel, seeing only the various ways he might help to bring GMO corn into Belize. It is sad that he is not using his education and his true knowledge base or his own character and good conscience to say and do what is the scientifically, ethically and morally RIGHT thing to do. Instead, it appears that he is letting his boss, the BGGA, choreograph his actions as well as his words... even though he KNOWS them to be mistruths.

We at BAGMO know that current independent research with GMO crops tells us many things. We know that GMOs destroy biodiversity, harming much more than just the intended target pest or organism. We know GMOs contaminate other corn fields. They cannot be contained. We know that GMOs cause contamination to organic farmers, destroying their livelihoods. And we know that GMOs do not benefit the consumer in any way. In fact, they are being found to cause health problems rather than being more nutritious or healthy.

There IS a short term GAIN for the corn grower, but because we are now able to look back over the years and see the patterns of happenings, we now know that the moment the farmers plant that first GMO corn seed in the ground, they begin what essentially is the START of their own downward-cycling funnel ride that very often results in the grain growers losing their farms due to financial distress. The GMO developer HOOKS the farmers with visions of early success, and then there is just no getting UNHOOKED.

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The farmer has no choice but to become a consistent consumer, feeding this ever-hungry agro-chemical corporation... having to pay more and more each season for newer seeds and stronger pesticides... and all the while degrading the soil, polluting the waters, contaminating other crops, and killing unintended insects and organisms.

We must recognize that to have GMOs brought into Belize to grow (either by accident, force, coercion, or legitimate channels) is a decision and an action that would have irreversible, negative impacts on all of Belize, its environment and its people. We must therefore push for Belize to adopt the Precautionary Principle and error on the obvious side of safety, logic and reason. Belize must say NO to the growing of GMO crops.

Many thanks to you and The Ag Report for keeping the GMO issue on the front burner.

Denise A. Frank
Owner of Ms D›s - Kills ‹Em Dead Cockroach Bait
Belize City

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Response to The Bias Against GMO by John Carr (Issue 21 pg. 22)

Dear Editor,

> Extract from Carr: *When we humans hold a bias concerning a certain issue, that bias can be regarded as truth...*

Summary of Carr's argument: "Everybody's doing it!" Therefore, we should (be able to) to it too. This proclamation has nothing to do with the relative merits of doing it. If a million people say (or do) a stupid thing, it is still a stupid thing, as Bertrand Russell once pointed out. History has many examples where doing the wrong thing was the norm. Going along with norms or popular practices is merely chasing after the herd, not thinking or *investigating*, but merely *proclaiming*. Anyone can proclaim. Investigation takes work and Carr's article shows not one instance of any result of investigation. Shame on him.

> Extract from Carr: *There are dozens of products on our Belizean grocery shelves that say "Made in the USA and contains corn and soy bean ingredients (which are most likely to be GMO)". When a country takes on the validity of GMO it is usually to increase yields and in the case of Belizean GMO corn it would increase exports.*

"When we humans hold a bias concerning a certain issue, ..." Increasing yields from GM crops is one. It is an assumption. The facts show otherwise to those who place any value on objective evidence. Truth is objective to some of us, not merely my opinion versus yours. It is bigger than anyone's opinion. You can listen to it or ignore. It. The pro-GMO people in Belize show that they are ignoring it by not addressing the numerous objections *from research studies* that controvert their facile claims about the wonders of GMO. Where is their evidence? Carr can only tell us to follow the herd. It is another way of saying that he knows of no substantial evidence controverting what has been said against GMO.

> Extract from Carr: *It also would allow the Belizean farmer to use a greatly reduced amount of real poisons that he uses to kill pests and weeds. The question is, "Which truth will win?"*

We are all in favour of reducing agricultural toxins, yet this claim – this proclamation of reduced toxins using GMO – is given no support by Carr while others of us have shown from careful research and credible researchers (Carr is not one of them) that this is not true.

If pro-GMO people have any real support for their position, would they please quit philosophizing about truth and making proclamations, and show us credible research evidence instead? I am against agricultural use of GM crops because I have looked at the overall issue and have been persuaded by objective facts – not philosophical conceits – that it is not in our best interests to allow it into Belize.

Dennis Feucht

AG BRIEFS

Kudos to the scholars from **Bishop Martin High School** in Belize City who beat all their fellow Caribbean national winners in the Sagicor Challenge with their project *Coconuts 4Life Eco-Park*. In addition to the glory, Bishop Martin H.S. won US$5,000. A coconut orchard and eco-park are now planned, where coconut drinks and food and craft items can be produced.

The continuing flow of migration from rural to urban (65% rural in 1961 to 48% rural in 2001) in Central America, combined with the aging farming population is a wake up call for food security. The average farmer age in Central America now approaches 60 yrs (all C.A. countries except Nicaragua). In the USA, 60% of farmers are over 55 yrs, and for every 1 farmer under 25 yrs, there are 5 over 75 yrs.

The Latin American Herald Tribune reports that **22 of Mexico's 32 states are being severely affected by this year's drought conditions,** some with up to 40% crop losses. This is predicted to further fuel the ongoing exodus from rural areas to cities.

In the Belize 2013/14 total budget estimates the allocation to the Ministry of Natural Resources and Agriculture has declined to 1.91% of the total budget, down from 1.93% in 2012/13's budget.

The NY Times article ***"Monarch Migration Plunges to Lowest Level in Decades"*** reports that the Monarch's world famous migration to winter in Michoacan, Mexico, is nearing the tipping point of no return (2.5 acres). Butterfly colonies are estimated by acreage, since it would be impossible to count them individually. The current wintering acreage is estimated at 2.94 acs, down from a one time 50 acs. In the last decade the decline has escalated and just since 2011 there has been a 59% decline. Butterflies are classically used as environmental indicators or "forward indicators of the health of the food chain". Two factors are allegedly causing the frightening shift: weather conditions - drought and record-breaking heat which dries eggs and lowers milkweed nectar (milkweed being their primary food) and "changed farming practices in North America". Habitat losses, depriving the Monarchs of their main food sources, are attributed to increasing farmland (25M new farm acres in USA just since 2007) and increasing amounts of genetically-engineered (GE) soybean and corn crops planted in North America. GE crops are often herbicide tolerant types, but the milkweeds that grow close to them are not tolerant, destroying the butterflies' food supply. The spokesperson from World Wildlife Fund in Mexico states that Mexico has addressed the situation, shutting down illegal logging in reserves used by the butterflies. He opines that "the United States has to do much more".

Bees, from the BBC: Great Britain's MP's of the Commons Environmental Audit Committee have asked for a moratorium on neonicotinoid sprays, although to date UK has failed to endorse the EU ban on these chemicals. Bees and insects pollinate about one third of the world's crops, and many of these are suffering extreme population declines. The UK committee states that "a growing body of peer-reviewed research points the finger at a group of pesticides called neonicotinoids." These are water soluble, and are taken up by the plant to become systemic – meaning that the entire plant becomes toxic: roots, leaves, stem and pollen. The toxins act upon the nervous systems of insects who consume the pollen. In Belize, neonicotinoids are widely used as seed treatments for grains.

Del Monte Fresh Produce, headquartered in the Cayman Islands, has approval from the US Department of Agriculture (USDA) to ship their "Rose" cultivar GE pineapple (which has a rose color flesh) grown in Costa Rica into the USA. The USDA finds this particular pineapple is a regulated transgenic crop and yet is not requiring a biotechnology permit. The US Food and Drug Administration (FDA) has still not approved the import. Hawaii has a ban in place prohibiting the import of transgenic pineapples.

Banana peels as water purifiers: Brazil's Center for Nuclear Energy in Agriculture (CENA) has discovered a novel use for banana peels: removing atrazine and ametrine,* herbicides used in cane and corn cultivation, from contaminated water. They have used this new technology successfully in the State of Sao Paolo, in the Piracicaba and Capivari Rivers and suggest that this method might be used to remove pesticide residues to meet potability standards, as the current methods used do not remove these toxins. Banana peels compose roughly 30-40% of the entire fruit's weight. For use as a water purifier, skins must be dried in an oven and crushed to a powder. The hydroxyl and carboxyl groups in the pectin are what enable the banana peel to absorb heavy metals and organic compounds. Other uses for banana peels include fertilizers, animal feed, and production of proteins, ethanol, methane, pectin and enzymes.

* Belize farmers use both atrazine and ametrine.

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Local and Regional Fuel Prices

	Cayo, Belize	Quintana Roo, Mexico	Peten, Guatemala
REGULAR	↑$11.83 Bz/Gal	↑ $6.71 Bz/Gal	↓ $9.59 Bz/Gal
PREMIUM	↑$12.21 Bz/Gal	↑ $7.06 Bz/Gal	↓ $9.86 Bz/Gal
DIESEL	↓$10.46 Bz/Gal	↑ $6.93 Bz/Gal	↓ $9.05 Bz/Gal

Ag Briefs...Continued on page 29

Forbes Magazine reports a marked **increase in sales of U.S. ranchland**, especially large ranches, purchased by newly created domestic oil and natural gas energy moguls looking for places to park funds. Typically a US commercial ranch may yield 3-4% return, and a 'hobby' ranch, used for recreation, hunting and fishing, may yield 1-2%. Brokerages handling multimillion dollar ranch listings report decreases in their inventory pools yet increases in revenue through more sales. Prices for Iowa farmland have soared 90% since 2009.

Belize is also experiencing somewhat of a farm and ranch land 'boom' with a strong surge of prospective and actual buyers, both native Belizeans and foreigners. A new generation of Belizeans is awakening to local farming and agricultural value-added opportunities. Tillable farmland tops the most sought after list, followed closely by raw land and small farms.

Although European Food Safety Authority (EFSA) has approved GMO crops, **Poland** joins 7 other EU countries (Austria, France, Germany, Hungary, Luxembourg, Greece and Bulgaria) all of which **ban the cultivation of GMO crops**. Poland's Agriculture Ministry fears cross pollination with non-GMO crops and also fears the GMO pollen could contaminate honey. They report that "there are no scientific assessments confirming that GMO crops are safe for the environment and people".

A 10 year moratorium on field trials of all GMO foods and termination of ongoing trials of transgenic crops was the recommendation of a committee appointed by a Supreme Court in **India.**

As noted in the Ag Prices at a Glance (page 17), the **cattle sweep** is progressing slowly but surely and to date **no diseased animals have been found**.

Pineapples... Continued from Page 21

This would explain why diets rich in vitamin C have been shown to be useful for preventing or reducing the severity of all of these conditions. In addition, vitamin C is vital for the proper function of the immune system, making it a nutrient to turn to for the prevention of recurrent ear infections, colds, and flu. Just one cup of pineapple supplies almost 140% of the daily value (DV) of vitamin C.

Pineapple is an excellent source the trace mineral manganese, which is an essential cofactor in a number of enzymes important in energy production and antioxidant defenses. For example, the key oxidative enzyme *superoxide dismutase*, which combats free radicals produced within the mitochondria (the part of our cells that produce energy), requires manganese. Just one cup of fresh pineapple supplies 128% of the DV for this very important trace mineral. In addition to manganese, pineapple is a good source of thiamin, a B vitamin that acts as a cofactor in enzymatic reactions central to energy production.

If you were taught that carrots would keep your eyes healthy, you should now think "fruit" as well. Data reported in a study published in the *Archives of Ophthalmology* indicates that eating 3 or more servings of fruit per day may lower your risk of age-related macular degeneration (ARMD), the primary cause of vision loss in older adults, by 36%, compared to persons who consume less than 1.5 servings of fruit daily. Three servings of fruit may sound like a lot to eat each day, but pineapple makes a tasty contribution to any meal. Besides enjoying chunks of it by itself, add it to smoothies, yogurt, any fruit and most vegetable salads; for example, add chunks of pineapple to your next coleslaw or carrot salad. I have also cooked it a bit with corn starch as a dessert topping.

Pineapple, or *Ananas comosus*, belongs to the *Bromeliaceae* family, from which the enzyme bromelain, was named. Its name (piña in Spanish) comes from its similarity to the pinecone. We all know what it looks like but did you realize that pineapples are actually not just one fruit but a composite of many flowers whose individual fruitlets fuse together around a central core? Each fruitlet can be identified by an "eye," the rough spiny marking on the pineapple's surface.

It is thought that pineapple originated in Brazil and Paraguay; it was well distributed throughout Latin America by the indigenous population before Columbus found it and took it back to Spain. Portuguese and Spanish explorers carried pineapples aboard their ships as protection (from its high vitamin C) against scurvy and soon introduced them into Africa and Asia where they flourished. As a matter of fact Thailand, the Philippines, and China are now three of the largest exporters of pineapple, along with Brazil and Mexico.

PLANTER CONTEST

Use either a banana or plantain stalk to create a planter. Send us a picture by or before September 10, 2013. Prizes for Most Attractive and Most Unique (1st & 2nd Place Winners) *Prizes are baked goods Sponsored by Sweet Ting Pastries and The Belize Ag Report.

Sorghum...Continued from page 13

In Ethiopia, in the 1800's it was written that durra (milo),was often planted on new ground because it required less plowing than other crops, the roots decomposed easily into fertilizer for subsequent crops, and farmers believed that it did not exhaust the subsoil as much as other crops. In Belize, with the recent challenges of fungus in fields used for beans, many feel that milo helps to somewhat clean and restore the soil. Milo has many attributes which allow it to be very drought resistant, especially compared to corn. Its high ratio of roots to leaf surface area is an advantage. In times of drought, milo rolls its naturally waxy (moisture holding) leaves which reduces water loss. If necessary it can go into dormancy rather than dying.

The main varieties planted locally are Pioneer 83G15 and Pioneer 84G88. Both seed types cost the same ($148.20/44 lbs). The 83G15 is slightly shorter than the 84G88. Prior to 1940 almost all milos were 5-7 feet tall, causing difficulty in harvesting. Almost all current varieties have 2 or more dwarfing genes, dropping the height to a more manageable 2-4 feet. Approximately 7 lbs/acre seed is standard here, with 110 lbs NPK applied at planting and then two side dressings of 60 lbs each. Costs to plant milo are approximately 25% cheaper than corn or beans; harvested corn prices average 20% higher than milo. Milo should not be confused with sweet sorghum produced in many parts of the world although both are varieties of Sorghum bicolor. In North America, sweet sorghum is often called sorghum or sorgo while grain sorghum there is called milo. Sweet sorghum, usually taller than milo, is mainly grown for syrup and ethanol production. In sweet sorghum, the stalk is the main product, rather than the grains, which are smaller.