

# The Belize Ag Report

*Belize's most complete independent agricultural publication*



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2011

ISSUE 12

## The Egg-citing, Incredible Edible Egg

By Orlando Habet (MSc. Animal Science)



Table eggs are produced by hens of various breeds and the genetic composition of these hens is their design for the difference in color of the shell. Their genetics also contribute to the number of eggs laid in a year and the efficiency of egg production (number of eggs per pound of feed).

The difference in color of white and brown eggs is due to the specific breed of hen. Hens with white feathers and white earlobes lay white eggs, whereas hens with red feathers and matching-colored earlobes lay brown eggs.

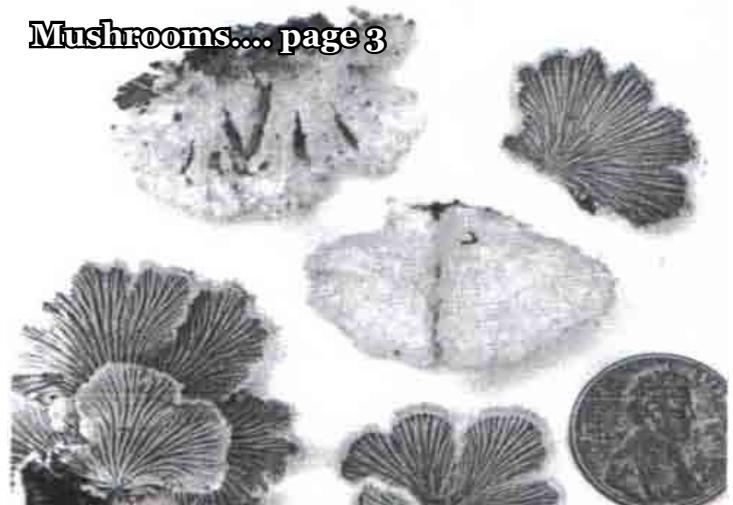
The most common breeds of chickens used for egg-laying are the White Leghorn, the Rhode Island Red, and the New Hampshire. White Leghorn chickens are white and lay white eggs. Rhode Island Red and New Hampshire chickens are reddish brown and lay brown or brown-speckled eggs. Several breed 'lines' are developed from the main breeds. In Belize the major brown egg lines are Hyline Brown (95%) and Bovon Brown (5%). The commercial layer is considered an egg laying machine as it can lay up to 300 eggs in one production year.

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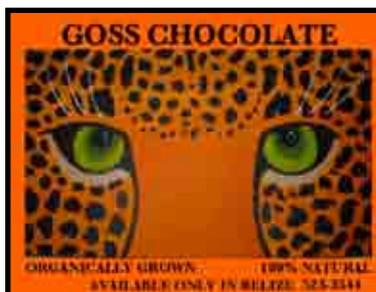
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## MUSHROOMS

BY DR. ALESSANDRO MASCIA

**Focus on a Kekchi Mushroom: *Schizophyllum commune* or Split Gill.**

In the last mushroom article, I gave a whirlwind tour of the mushrooms I had found in the Stann Creek and Toledo Districts. In this coming series of three articles I'll describe some of the mushrooms eaten and used by the Mayans around here and give enough information on them so that all of you starved fungophiles out there have something new to try.



The common name of this fungal fructification is Split Gill and its Latin name is *Schizophyllum commune*. However, I haven't been able to find out the kekchi name for it and even though it has been pointed out to me by a number of locals, none of them have been able (or willing) to call it anything other than "mushroom...good for eat." If any readers out there recognize it and can discover its native name, please let me know.

What follows is a *verbatim* scientific description by the professional mycologist, David Arora (writer of my favourite mushroom identification guide) to help you identify the Split Gill mushroom.

**FRUITING BODY:** shelf-like or with a narrowed base, tough and leathery both fresh and dry. **CAP:** 1- 4cm broad, more or less fan-shaped (or vase-shaped if stalk is central); surface dry, densely hairy, white to grayish-white, gray, or sometimes brownish-gray when wet; margin usually lobed and inrolled in dry weather. Flesh tough, leathery, thin, pallid or grayish. **GILLS:** radiating from point of

attachment, well-spaced, white to grayish; edges appearing split or grooved lengthwise (i.e. cuplike in cross-section), rolling back in dry weather. **STALK:** absent or present only as a narrowed basal point of attachment. **SPORE PRINT:** white; spores 3-4(6) x 1-1.5(3) microns, cylindrical, smooth.

This mushroom comes up almost everywhere and if you pay attention to mushrooms, you have probably seen it. I've found it growing throughout the bush on dead wood from little branches less than a centimetre up to big sticks five or ten centimetres in diameter. It likes to come up especially after people do a bit of slash-and-burn and there are a few charred sticks around but wait for the rains and it appears as if by magic. More commonly, it pops up throughout the year except maybe when the weather is really, really dry. If you find any then, probably you are finding the dry fruit bodies from wetter times. If you use polewood or bean poles around your farm for fencing, chances are that after a few months out in the open they will be covered by these little mushrooms.

Okay, let's talk about edibility. The guide says: "Too small and tough to be of value." In my humble opinion, it is okay but not great. So, why am I telling you about it? Well, since we are all interested in broadening our cultural horizons and trying to encourage the Kekchi to preserve their traditions instead of adopting the unhealthy Western culinary traditions, let's all try something new. According to my local source, you collect a few handfuls, boil them in water, fry them and then serve up with caldo. We just stir-fry them; they add a chewy "mushroominess" to a meal.

Medicinally, I know absolutely nothing about whether this species has any properties. (Apparently some natives in Madagascar chew it but for reasons unknown.) The only thing I know about it from "the real world" is that it has been used extensively in the laboratory for genetic studies since it is easy to fruit in artificial conditions.

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## TO THE EDITOR

### Responses to Redmond's Letter to Editor, Issue 11:

Dear Editor,

I read your recent article in the Ag report with interest...You are correct that Belize needs more agriculture, but I believe that you are looking in the wrong place for knowledge and assistance.

Why do most believe that an "expert" is someone from out of town or out of the country? Sustainable agriculture is the agriculture of the future where land is improved every year, not depleted. Large scale agriculture is not for Belize but small chemical free farms are.

We do not have to spend big bucks to go to Brazil when the Springfield community south of Belmopan now produces large quantities of chemical free food using sustainable methods that need to be taught and replicated all over Belize.

Will Belize continue to be the servants of the big chemical and seed companies or will they take a different path? We are at a crossroads now. The health of Belize is suffering at the hands of agro-business.

Blessings, Dr. Morris F. Keller

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### GMOs: All that Glitters Is not Green

Dear Editor,

I welcome Frank Redmond's comments emphasizing ignorance about GMO. There is enough of it to go around, including among GMO researchers, the scientists who debate among themselves about various GMO findings. Maybe Mr. Redmond is unaware of how science is done. Words like "could and might" are common among scientists (and I should know; I have worked for years as a research engineer in one of the world's leading R&D laboratories). Bioengineers are learning a new technology that involves manipulation of the still-mysterious code of life itself. The side-effects of gene manipulation are far from being understood and the methods used to effect genetic modification are crude at best. Here are some sources of facts that should help to clarify the following misunderstandings of Mr. Redmond (in quotes) and others about GMOs.

"GM products have been rigorously tested in the USA and Europe for years and have been found not to have any adverse effects on humans or cattle."

To give an example of how little is known about the effects of GMOs, look at the European Food Safety Authority website articles on what is being studied about GM crops and their effects. This research is motivated by scientific ignorance - of what is not known - about GMOs. For instance (and there are many others),

Whether Bt maize can harm aquatic organisms like caddis-fly larvae has become a key topic in the scientific debate about the biosafety of Bt maize. The German ban on the cultivation of Bt maize MON810, which has been in force since 2009, is based in part on the results of a study published in 2007. A team of researchers led by Rosi-Marshall of Loyola University Chicago (USA) demonstrated in laboratory tests that caddis-fly larvae showed increased mortality and lower growth rates when they were exposed to the Bt protein Cry1Ab. Other scientists have challenged the significance of this study.

[[www.gmo-safety.eu/debate/1234.impact-maize-water-bodies-europe-sufficiently-researched.html](http://www.gmo-safety.eu/debate/1234.impact-maize-water-bodies-europe-sufficiently-researched.html)]

Note the disagreement among scientists. That means GMO has

significant unknowns and scientists are studying them. Some of the other studies are on the effects of GMOs on nematodes, earthworms, butterflies, microorganisms in the soil, and honey bees. None of this is well-known and it will take additional years of testing to understand the effects of genetic manipulation. *Rigorous testing* does not mean adequate or sufficient testing, and to conclude at this early state that "GMO is fine" is nothing more than marketing hype packaged to convince farmers wanting to increase their yields and wanting to believe it.

"As for gene alteration, we have been altering food crops since the beginning of humanity. GM crops introduce only the desirable traits into a plant."

Not so. From [www.responsibletechnology.org/gmo-basics/the-ge-process](http://www.responsibletechnology.org/gmo-basics/the-ge-process):

In traditional breeding it is possible to mate a pig with another pig to get a new variety, but is not possible to mate a pig with a potato or a mouse. Even when species that may seem to be closely related do succeed in breeding, the offspring are usually infertile - a horse, for example, can mate with a donkey, but the offspring (a mule) is sterile.

With genetic engineering, scientists can breach species barriers set up by nature. For example, they have spliced fish genes into tomatoes. The results are plants (or animals) with traits that would be virtually impossible to obtain with natural processes, such as crossbreeding or grafting.

"Bioengineering uses viruses and bacteria to alter genes" was considered "Half true" by Mr. Redmond. He writes: "A second method uses a bacterium."

Apparently he is unaware of the use of viruses. From the previously-cited webpage, a list of commercialized GMOs includes corn engineered with hepatitis virus genes by Prodigene.

It is not possible to insert a new gene with any accuracy, and the transfer of new genes can disrupt the finely controlled network of DNA in an organism. Current understanding of the way in which DNA works is extremely limited, and any change to the DNA of an organism at any point can have side effects that are impossible to predict or control. The new gene could, for example, alter chemical reactions within the cell or disturb cell functions. This could lead to instability, the creation of new toxins or allergens, and changes in nutritional value.

[[www.responsibletechnology.org/gmo-basics/the-ge-process](http://www.responsibletechnology.org/gmo-basics/the-ge-process)]

"There is no accepted scientific study that documents any relationship between cancer and GM foods."

About ill effects, "including severe allergic reactions to GMO based food.' This has never been proved."

While there is scientific evidence for links between cancer and allergic reactions with GMO consumption, the kind of certitude Mr. Redmond seeks is prevented in large part by the purveyors of GMOs themselves. As F. William Engdahl, author of *Seeds of Destruction: The Hidden Agenda of Genetic Manipulation* has written:

For the past decade, the period when the greatest proliferation of GMO seeds in agriculture has taken place, Monsanto, Pioneer (DuPont) and Syngenta require anyone buying their GMO seeds to sign an agreement that explicitly forbids that the seeds be used for any independent research. Scientists are prohibited from testing a seed to explore under what conditions it flourishes or even fails. They cannot compare any characteristics of the GMO seed with any other GMO or non-GMO seeds from another

*Continued on page 23*

## Organic Production Seeking the Perfect Yield in Belize...

By Greg Clark

Key choices and decisions made by farmers long before the first seed is put into the ground can affect the bottom line of profit or loss. Such questions as 'What soil preparation methods do I use?' 'Which crop is trending for the highest potential profit margin at harvest?' 'What is the cost of the input components to grow the selected crop?' must be considered. With the cost of fuel in excess of \$10/gallon, a farmer must make efficient use of fuel in building a soil bed for the future crop. A perfect soil bed will yield a better harvest, but to get that better harvest, fuel must be used. At what point is the fuel consumption going to achieve an adequate yield? The farmer is forced to consider how efficient he/she is using fuel. In Belize, based on fuel cost, the perfect soil bed is not built for the goal of maximum potential yield. Instead of investing in the soil bed, most farmers feel that, for the dollars invested, the maximum return on investment is through fertilizer. The fertilizers are utilized to make up for the shortcomings of the soil bed. So, for every crop, fertilizers are applied at a rate to compensate for the leeching of the soils. If the investment were made to capture and hold the nutrients at the root zone, less fertilizer would be required. A nutrient binder would hold the fertilizer in the root zone of the crop and if not utilized with the current crop, it would be a nutrient carry-over for the next successive crop. Therefore, an investment in a nutrient binder reduces the cost of fertilizer for future crops.

The second question from above requires knowledge in the current supply and demands of Belize and beyond. Belize has a limited consumption rate of commodity items, which restricts the production and growth potential of commodity items. Only so much corn can be grown to feed the chickens of Belize; only so many chickens can be consumed in Belize. Now, with export and trade agreements, many commodities can look beyond the limited consumption within the borders. The USDA/FAS forecasts that the world's stock of grains will decrease by 10.1% by the end of 2011. The world demands on commodities along with prices are increasing to a point that Belizean-grown commodities, even with \$10+ per gallon fuel, are competitive. Another factor to be considered is that organically grown products bring the highest prices. Now the export market becomes a feasible outlet in the decision of planting. Belize needs to have the ability to enter the export market.

For the question concerning the input components, many of the spray components cannot be forecasted. Specific cultivation, sprays and periodicity of spray applications are dependent on the insect infestation or invasive weeds. All of these items are a responsive investment for the crop and for the yield vs. expenses.

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

The key to controlling the cost of crop production, and thereby maximizing profit, is efficiency. Belize farmers need to consider efficiency increase across the board; for example, combining cultivation with spray applications. When both operations are conducted on a single pass there is a huge savings of gallons and gallons of fuel investment in the crop. For every efficiency enhancement that Belize undertakes, the competitive pricing of Belizean commodities become closer to meeting the world market pricing levels, thus enabling trading on a selective level rather than a crisis level. Pardon the pun, but Belize agriculture now has the excellent opportunity to "Grow Belizean Agriculture" for the future. That growth will ensure further growth of the industry. This is the **perfect yield for Belize.**

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## Responsible Nutrient Management By: Ing. Emmanuel Godoy

When talking of responsible nutrient management, many farmers say or think and even practice "the more fertilizer you apply the more production you get." Well that is true if the fertilizer is balanced, the soil needs it, and your crop will efficiently uptake that fertilizer applied. The mismanagement of fertilizer is a norm that most farmers practice. Let's look into one of the most used and misused nutrients: nitrogen. Over-application is probably responsible for more crop yield reductions than farmers realize.

Nitrogen is very important: in chlorophyll development, in the formation of amino acids which convert into protein, and critical in vegetative growth. Ammonium, another form of nitrogen, promotes fruiting.

Many things affect nitrogen efficiency; calcium and magnesium have a major effect and are generally ignored as being a factor. Calcium below 60% (base saturation) will reduce N uptake and magnesium over 15% (base saturation) will reduce N uptake. We need to increase N applications if either of the above conditions exists.

Consequences of over-application of nitrogen include: blocked potassium uptake, blocked zinc uptake, blocked manganese uptake, blocked copper uptake; it takes calcium off exchange sites and leaves magnesium and this tightens soil. Tight/compacted soil restricts phosphorus uptake.

Looking at all these factors that one nutrient brings to the table, we now have to consider that it is very important to understand how nutrients work, how much is needed and how much to apply so as to know and practice *responsible nutrient management*.

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# BEYOND THE BACKYARD

## Pass the Grass Please

By Jenny Wildman

On a recent tour of a friend's organic garden he told me he was planting only what grows in abundance which would not take hours of work each day. For continual food supply this is a sound approach. In observing our environment we see that nature provides many species in abundance mainly as they have huge and constantly challenging jobs to achieve. The discovery of what they are capable of is exciting and being able to identify edible plants in the wild is important. To date human survival can largely be put down to the Gramineae Family. Apart from the amazing work they contribute to the protection of the habitats, they provide a veritable cornucopia of fabulous food. While many grasses become tough and good for animal food, they still contain nutrients and could be lifesaving for humans. Wheat, rice and corn have become the principal crops which man now relies upon but there are many other members of this grass family. There are oats, barley, sorghums, millets, sugar cane and even reeds and sedges. Cattails and bulrushes grow in swamps assisting in protection from erosion and flooding and filtering out impurities. They are also completely edible. The shoots and the roots even raw are extremely tasty and free.

The family champion however is bamboo, one of the fastest growing plants on the planet. Standing in amongst a grove of majestic bamboo stanchions listening to the whistle of its branches is a moving experience. This grass can grow over 100 feet tall at an amazing rate of 40 inches per day and is often thought to be a tree. So within a few months each shoot can reach full height and then slowly begins to harden. It can reach maturity and culms ready for harvest in only 3 to 5 years making it an excellent eco-friendly construction material. I had seen bamboo described as a gregarious grass, meaning the clumping together of one particular type, but gregarious flowering had my mind spinning.

The same species of the plant can flower at the same time all at once regardless of location. In some bamboos that can be once in 40 years and after flowering it dies. It is like some sort of genetic memory that makes the plant remember it is time no matter where it is. If reliant on only one species as in

any form of monoculture the threat of disease or any sudden change in nature can completely destroy the livelihood and food supply of an area. In Mizoram this happened and vast areas of mautak bamboo began blooming in waves through the forests. The rapid abundance of seed nourished the hungry rodent population causing them to run chaotically through all the grain fields, granaries, paddy fields and vegetable gardens destroying whatever was in their path with a resulting famine. The fact that bamboo blooms infrequently does give it years of protection from daily predators; but wait! It has other problems. Bamboo is subject to attack by microorganisms, fungus and insects particularly during the rainy season when they are prevalent.

Bamboo should be cut in the dark phase of the moon. It is very versatile: used to make fabric and paper, musical instruments, pots, pipes, roofing, matting, furniture and many artistic projects. I have used the bamboo leaves as a mulch to preserve moisture and as chicken bedding for comfy nests. A panda's diet is mainly bamboo leaves but cattle and horses also feast as if manna from the gods. There are hundreds of varieties of bamboo but I discovered a list of 4 types in Belize and decided mine is probably *Guadua Longifolia*. For help in harvesting I found a video on the internet which was helpful but narrated in Japanese. However armed with a hoe, machete and shovel we followed the demonstration. The shoots should be dug as soon as the tip pokes up from the surface of the soil. You look for a clue like a crack or bump indicating something about to happen, a bit like hunting buried treasure. Once shoots grow higher they become bitter and poor culinary quality. Do not eat raw as some types contain cyanide but boiling for at least 20 minutes destroys this. I found a translation of how to cook by boiling in a big pot with rice bran to purify. The Japanese grandma said to change the water 4 times so that is what I do and add salt in the last water. You cut off the outer hard part and use the inner tender shoot. It is now ready to eat with a bit of melted butter or with a vinaigrette sauce like heart of palm or added to stir-fry or salad. Yes, fresh is best; none of that canned stuff. This was just to wet your appetite and gain added respect for the wondrous grass family and the big bamboo. Something new to try. So please "pass the grass." Delicious!!!! Any ideas on this and other related topics welcomed.

Jenny Wildman

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## Things you should know

Prior to the 1980's, attempts were made to diversify the local economy in Southern Belize to cacao. German owned Kramer's Estate exported 42,800 lbs in 1906 and 70, 000 lbs in 1970.

In the 1980's farmers started to commercialize cacao. Hershey Corporation developed a plantation of 500 acres of cacao which later became the exclusive market for Toledo's cacao.

In 1986 USAID began financial/technical Assistance; a group of 24 local cacao farmers formed the TCGA via assistance from the USAID's Toledo Agriculture Marketing Project.

In 1990 the price of Cacao fell to less than half its former value Bze\$ 1.00 per lb.

In 1991-1992 negotiations with Whole Earth Food Limited (Later Green and Black's Organic and now Kraft Foods Ltd.) commenced.

In 1993 TCGA was certified Fairtrade by Fairtrade Labelling Organization and Organic by Soil Association.

1990 to early 2000 Food and the God Chocolate was made in Belmopan.

In 2001 Hurricane Iris devastated the cacao industry. Farmers abandoned their farms thereafter.

In 2003 with the Maya Gold Project, an expansion program to increase acreage and production, new members joined the project and new acreage was planted.

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Land under cultivation .....	2,500 acs.
Producing farms .....	700 acs.
New farms.....	1,500 acs.
Average farm size.....	2 acs.
Average production per acre .....	500 lbs.
Average trees per acre .....	300 trees
Average annual production.....	62,922 lbs.
(past 10 yrs.)	

Growth requirements are ; fertile soil 3 ft. deep, 50% shade, 50" to 110" annual rainfall. Parts of Toledo, Stann Creek and Cayo Districts are well-suited for cacao.

90% of Belizean cacao is exported to Green and Black's Organic, U.K.

10% is processed locally by: The Belize Chocolate Co., Cyrila's Chocolate, Goss Chocolate & Cotton Tree Chocolate



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**NB. It is best to lime before applying NPK fertilizers!**

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## Pesticide Residues Screening in Fruits and Vegetables

By Delilah A. Cabb B.Sc. M.Sc.

The Belize Agricultural Health Authority (BAHA) in collaboration with the Taiwan Technical Mission (TTM), the Ministry of Agriculture and the



Pesticides Control Board (PCB) is implementing a pilot project entitled: "Pesticide Residues Screening in Fruits and Vegetables". The duration of the project is two years. Implementation started in January 2011 and is to be completed by December 2012.

Belize-Based TTM funded the project in the amount of an estimated BZ\$249,000.00. and provided lab equipment including a spectrophotometer, a refrigerator, a fume hood, reagents, and laboratory supplies and a monthly stipend for a volunteer to assist in laboratory analysis of the samples.

The main objective of the project is to test produce prior to harvesting to ensure that once it goes to the market, it does not pose a health hazard to consumers. In the event that high levels of pesticide residues are detected, harvesting will be delayed until such levels are either below or within the maximum residue levels allowed per crop.

Maya Green Growers, and associated group of farmers in the Cayo District are the target group. Other participants include the organic producers. Given that this project is only screening for the presence or absence of carbamates, organophosphates and fungicides, the sample amounts are either a pound, a bundle or head depending on the nature of the commodity.

The Food Safety Laboratory in Central Farm receives samples from the target group on Mondays and Wednesdays of every week. As the project proceeds, eventually every positive sample will require confirmatory testing to be done at the Central Investigation Laboratory in Belize City for which a five pound sample will need to be collected and submitted to them for further analysis. Farmers will be expected to provide the samples free of cost and BAHA shall not charge for the analysis during the life of the project.

It is the TTM based in Belize that provided the methodology for a the screening of pesticides residue in fruits and vegetables. They are also responsible for the training of BAHA personnel and providing support to the farmers.

BAHA Plant Health Department is responsible for offering training on sample collection and submission of pests to the laboratory for examination, basic pest identification, updating the pest list, and providing training in integrated pest management. The Food Safety Department in BAHA collects the sample produce from the field and are responsible for submissions to the laboratory.

The Pesticide Control Board is committed to training and certification of the Maya Green Growers in the safe handling of pesticides. Other training will also include: calculation of dosages, calibration of spraying equipment, safety measures in the application of pesticides, handling and storage of pesticides, provision of lists of approved pesticide per crop and guidelines on the reading and interpretation of labeling on pesticides.

The Ministry of Agriculture has a key role in the execution of this project. Under their guidance the farmers for the project were identified and they will be responsible for the overall coordination of meetings and training, and provision of extension services and logistical support.



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# CAMPAIGN FOR THE PROPER DISPOSAL OF EMPTY PESTICIDE



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- Makes container disposal easier
- Gives you full value for your product

## DISPOSAL OF EMPTY PESTICIDE CONTAINERS

The inappropriate disposal of empty pesticide containers can result in health risks for humans and livestock as well as cause environmental pollution.

Empty pesticide containers must be disposed of according to local best practice guidelines. Most pesticide containers are made of plastics although there are still some products sold in glass or metal containers.

**Disposal of empty pesticide containers is a two step process:-**

1. Ensure that the container is clean, by triple rinsing.
2. Dispose of the clean triple-rinsed container in a way that follows local best practice guidelines.

**Rinsing of empty pesticide containers:-**

It is important to reduce the hazard of empty pesticide containers before disposal. This can be done by rinsing the empty containers.

There are three types of systems used to rinse empty containers. Manual rinsing is used for knapsack sprayers while the other methods are used with tractor powered sprayers.

1. **Manual rinsing:** Empty pesticide containers are triple rinsed and the rinsate poured into the knapsack sprayer and sprayed along crop borders.
2. **Pressure rinsing:** A hose fitted with a spike – containing a nozzle – punctures the bottom of the container forcing water into the container, washing into the spray tank.
3. **Integrated rinsing:** The rinsing mechanism is usually built onto the sprayer's closed transfer system but can be an independent system. This fast, safe way washes containers and minimizes the risk of spills. This is the most popular mechanized cleaning method.

**Manual triple rinsing of empty pesticide containers:-**

Before disposal, containers MUST be triple rinsed.

Studies show that thorough manual triple rinsing will remove 99.99% of chemical residues (ECPA 2006).

**DON'T FORGET TO WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES!!**

## Modernizing Agricultural Extension Services of Belize

Under a consultancy assignment by the Food and Agriculture Organization of the United Nations, in 2010 Dr. Kalim Qamar conducted a study of Belize agriculture extension services. Dr. Qamar has done similar studies all over the world and provided many insights for the MAF to consider. A workshop to review and provide feedback for the final report was conducted on May 9 and 10 at the UB Central Farm. Dr. Qamar was assisted by colleague, Dr. John Pressing, who came from FAO in Rome to help present the findings and recommendations of the study.

The group of 50 representatives from Ministry of Agriculture and Fisheries staff, NGOs, Partners in Development, and extension officers from each district received encouraging remarks from the Honorable Rene Montero, Minister of Agriculture and Fisheries, as well as Mr. Gabino Canto, Chief Executive Officer of MAF.

Ricardo Thompson, Coordinator of Extension Services, moderated the lively discussion and small group participation by extension personnel and MAF staff. The group reviewed and provided detailed feedback on the vision, mission, strategic objectives and details of implementation as well as a proposed organizational restructuring which included the functions of monitoring/quality control and training/communication. Five key issues were agreed upon: (1) the less than 1% of the national budget allocated to MAF and, in turn, the extension services, needs to be increased to reflect the importance of the agricultural sector to Belize's economic future, (2) the organizational restructure and implementation should include a clear career path for extension officers, (3) the organizational restructure and implementation should include clear lines of communication between extension service officers, who typically are generalists, and R & D personnel, who are specialists, to effectively support the farmers, (4) more farmer participation in defining specific extension services oriented to their needs, and (5) greater networking and synergies among agricultural institutions in order to optimize the use of available resources and better address the needs of rural communities.

It is anticipated that by the end of the FAO Technical Cooperation Project, a policy and strategy will be in place that will form the framework for further modernization of agricultural extension services to meet the needs and demands of the rural producers.



## International Course on Common Bean Management in Goiania, Brazil

By: Clifford Martinez Jr.  
Agriculture Officer,  
Central Farm, MAF



Brazilian agricultural technology in the production of soybeans, wheat, corn, rice and beans is considered exemplar in South America as well as globally. Having promoted development based on sustainability, over the past 20 years, grain production in Brazil grew 127% with a 25% increase in sow area. The use of new technologies has also enabled the increase in livestock production and cultivation of fruits and vegetables in the country. Most of the gains came from productivity growth in rural Brazil, which began in the laboratories of the Brazilian Agricultural Research Corporation (Embrapa), founded in 1973. To help build tropical agriculture leadership in Brazil, **Embrapa invested heavily in its staff training**. Today, the institution has nearly 9000 employees, of which about 2000 are researchers - 21% with master's, 71% doctoral and 7% with post-doctorate.

As part of an agreement on technical cooperation between the governments of Brazil and Belize signed in June, 2005 and promulgated on November 3, 2008, implementation of project "Human Resource Training and Variety Validation for the Production of Beans in Belize" was initiated. The first phase of a series of training and capacity building in grains production technology and management enabled six Belizean technicians to participate in a one week course titled "International Course on Common Bean Management". The participants included: two CARDI technicians, Hector Reyes and Martin Lindo; three extension officers, Carlos Tzul, Leonardo Eck, Mario Howe; and one MAF officer, Clifford Martinez Jr. The training took place in August, 2010 at the Embrapa facilities for beans and rice technology in San Antonio de Goias, Goiania, Brazil.

Teams from both countries shared information. Embrapa project coordinator Dr. Tarcisio Cobucci informed that the objectives of Embrapa research institute were based on projects that provide sanitary and quality plant material, accredited research information, publications and **guaranteed efficiency of its extension service**. The Belizean representatives gave a description of the grains sector and the different mechanisms influencing its growth, highlighting the strengths and weaknesses of the sector as well as salient issues requiring immediate intervention.

Brazil's bean harvest occurs three times per year with the use of improved conventional practices, mainly the use of the central pivot type irrigation system. Embrapa assists small farms in Brazil, which are holdings measuring less than 60 hectares and worked by family members, with the use of Embrapa technology and **government aid subsidies**. National survey indicates that 74.4% of all Brazilian farms are part of this Small Family Agriculture System, which guarantee domestic food security, while 26.6% are non-familial, the latter producing 87% of agriculture production for export.

In addition to information exchange, training activities included field visits and practical classes on plant health and nutrition, geared at procedures and principles to ensure quality control norms and phyto-sanitary measures, and a briefing on international standards for seed testing.

Integrated disease management case studies included soil-borne pathogens and common bean pathogens relative to Belize. As a part of its strategy to combat viral diseases Embrapa has developed a **genetically modified bean variety** that has shown resistance to the Bean Golden Mosaic Virus-transmitted by vector whitefly *Bemisia tabaci* and *Bemisia argentifolia*. This variety is scheduled to be sold in the open market late 2011. While the issue of GMO remains a heated debate globally, research institutes like Embrapa advise for *qualitative and quantitative testing and analysis* so as to guide policy writers and stakeholders before establishing norms and procedures specific to Belize. Those established by an agro-technologically advanced country like Brazil may not necessarily be the best model for developing countries. Conclusively, it remains a subject that **warrants a participatory approach** from stakeholders, shareholders and other partners in the sector before concrete and irreversible decisions are made.

The key activity of the training was to **design a follow-up project for Belize**, including the establishment of a demonstration plot and a farmer's field day to showcase adoptable varieties for Belize and share the experience gained from the course. Data used for this activity include; climatic conditions, location of trial (plot size), recommended varieties and specific crop management practices.

### Recommendations/follow-up:

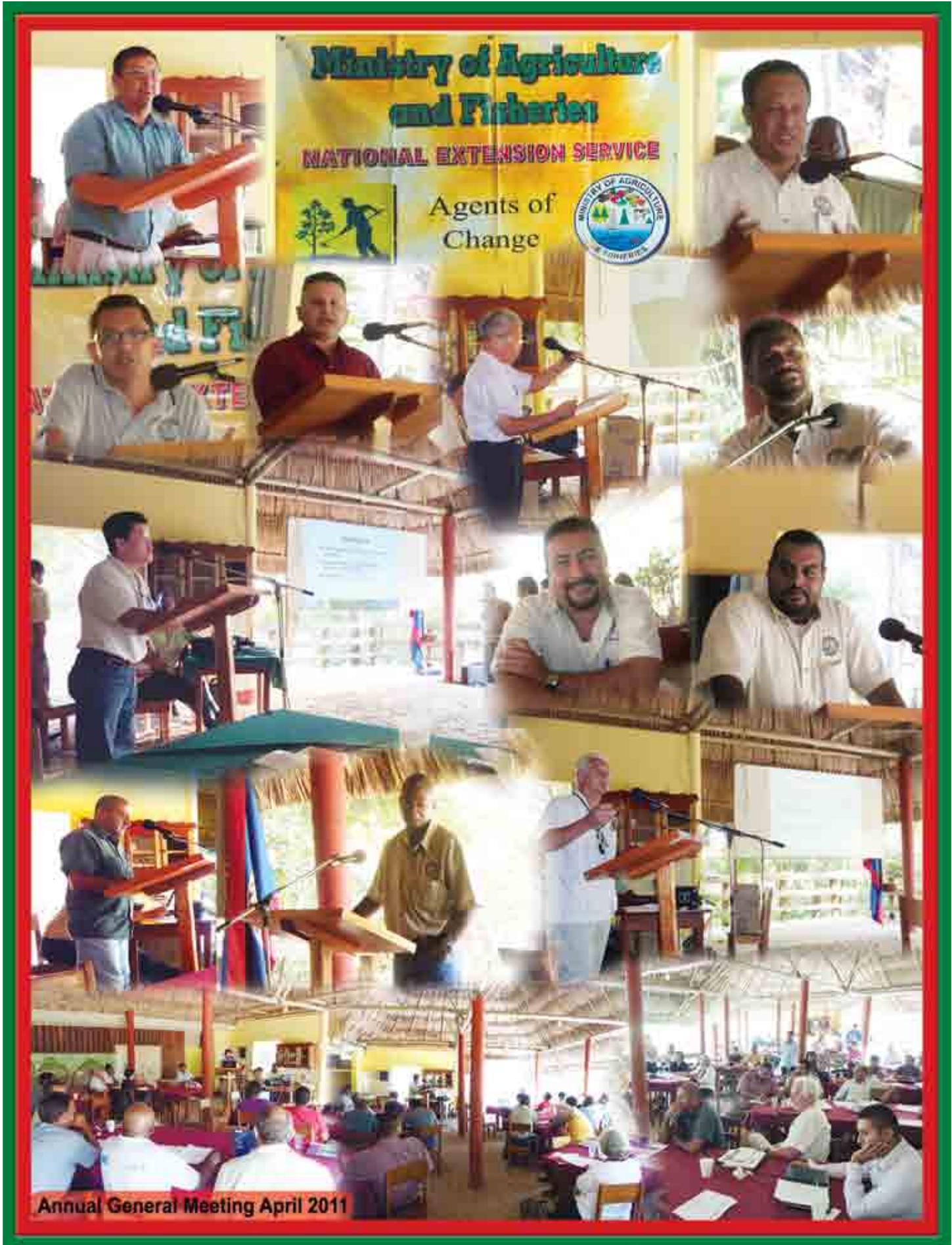
- The need for the development of a grains strategy/policy and grains certifying committee in country, considering the new trade agreements for exportation regionally and internationally.
- Commitment for continual collaborative information, experience and technical training from Embrapa-Brazil to Belize.
- An analysis of the impact/effectiveness of current grain development projects in Belize, by MAF and partner organizations.
- Training/workshops and resource materials of relevance to be allowed public access, but more importantly in user-friendly mode.
- Support/Development policies targeting regulation/control of imported bean varieties with emphasis on food security, protected/preserved native/cultural varieties and potential import replacement.
- Tangible follow-up to the training: establish a demonstration plot showing the different varieties and conduct a field day showcasing these results to farmers and other technicians. Initially it was proposed that the Corozal and Cayo (Central Farm) district be the locations.

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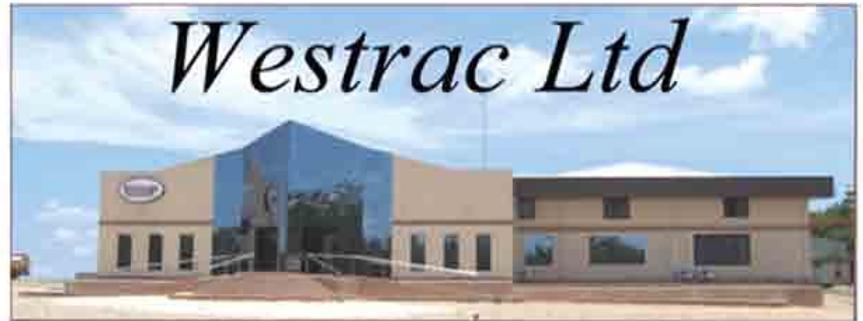
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## Agriculture Prices at a Glance

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

<b>Belize Cattle</b>		T	A (\$)	B (\$)	<b>Grains, Beans &amp; Rice</b>		T	A (\$)	B (\$)
Young str. & bulls- 750- 1100 lbs	H	1.10 -1.15	1.00 - 1.10		Belize yellow corn	H	.34 - .35	.32 - .34	
Cows & heifers for butcher	S	.70 - .80	(thin).60 - .70		White corn	H	.35 - .37	.33 - .35	
Heifers for breeding 650-900 lbs	S	1.00 - 1.15	.90 - 1.00		Corn/ local retail (low volume)	H	.40 - .45	.38 - .40	
Young grass cattle- 350- 650 lbs	S	1.00 - 1.10	.90 - 1.00		U.S corn price @ 6.81-up from 3.75	H	27.00 (May 25 futures)		
U.S price -corn fed- 1000- 1200 lbs	L	1.05/US=2.10/Bz			Guatemala corn price/Peten	H	.40 - .45	.38 - .40	
U.S price - feeders 600- 800 lbs	S	1.20/US=2.40/Bz			Belize milo	H	.29 - .32	.27 - .29	
U.S price- calves 450- 600 lbs	S	1.35/US=2.70/Bz			R-K's, little reds & blacks (beans)	H	1.00-1.25/ farm price		
U.S price- aged butcher cows	S	65-75/US=80-1.40/Bz			Black eyed peas	H	.80-.90/ farm price		
<b>Belize Hogs</b>					Milled retail rice per pound	S	.90- .95/ farm price		
Weaner pigs- 25 -30 lbs-by the head	S	95.00 - 100.00			<b>Citrus</b>				
Butcher pigs 125 - 200 lbs	S	1.80 - 1.85	1.70 - 1.80		Oranges per 90 lb box-lb.solid basis	S	11.50 est. 2011 price		
<b>Belize Sheep</b>					Grapefruit- per 90 lb box	S	6.00 est. 2011 price		
Butcher lambs	S	2.00 - 2.50	1.75- 2.00		<b>Sugar</b>				
Mature ewes	S	1.70 - 1.75	1.60 - 1.70		Cane per ton- est. 2010 price	H	130. 00		
<b>Belize Chickens</b>					White Sugar- 112 lbs- controlled	S	45.00 per bag		
Broilers- live per lb	H	1.15- 1.17	1.13- 1.15		Brown Sugar- 112 lbs- controlled	S	39.00 per bag		
Old hens	S	.75 - .76	.73 - .75		<b>Fruits &amp; Vegetables</b>				
<b>Special Farm Items</b>					Tomatoes, cabbages, cucumbers	S	whosal/.75-1.75	ret/1.00-2.50	
Shrimp retail- farm raised	S	6.50 - 8.50	5.50 - 6.50		<b>Bananas</b>				
Eggs-tray of 30 eggs	S	4.58 /farm price			Export @ 40 lb box	S	price-	14.00 - 15.00	

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

**Dear Ag Readers:** I find it exciting to be a part of the food production chain. Almost every newspaper and Google will talk about shifting food consumptions, varying supplies, prices and maybe the biggie is CLIMATE CHANGE. We at Banana Bank are at almost 20% of normal rainfall for the last several months- Normal for us is 75 to 80 inches annually with 65% in June to January. Record setting corn prices have been the result of all this. It might be a good time to think about a garden. I heard a statement at the chess Olympiad in Belmopan. You need to learn to "Win with Humility and Lose with Dignity"-what a lesson if we could all learn that. God Bless. John Carr

## LIGHT REIN

By Marjie Olson

### Calling All Horse Owners

#### Events

When you are a horseman/woman in the US you have literally hundreds of things you can do with your equine buddy including competing in horse shows all over the country in hundreds of varying classes to trail rides and numerous clinics and seminars to learn more about horses. Limited equine activity is probably the toughest thing for me to accept here in Belize. The only routine competition was/is track racing but the tracks are not well-maintained and can be dangerous to horse and rider. Belize has an occasional rodeo, but they do not get advertised well enough to know about them most of the time. Jumping events have been tried and have failed. Now we have the endurance races starting to be an annual event; we hope we get some serious entries for the next stage of the Triple Crown Endurance Race (TCER) or it may go away as it is way too much money and work to host the races for 3 or 4 horses. So what does a competitive horsewoman who wants to do more with her horses than just trail ride do? I try to create a few more events for us all to have fun. Barrel racing and the speed or gymkhana classes seem to be a sport that a lot of people enjoy doing. It is also a good spectator event. We had a lot of fun at the TCER open shows, but again, very few entries.

I know the toughest part of getting people to participate in any event is getting the horse to it! Very few folks have access to trucks and trailers and with fuel prices, AIE YAIE YAIE... Plus the distances between events can be hours and hours. Trust me, I know; I live in the Mountain Pine Ridge and cannot do over 5-8 miles an hr with a horse in the trailer without fear of injury or causing too much stress.

It is important to consider that good safe ground is a must for any type of horse event, whether it be racing, barrels, poles, or endurance. All need to have footing that can help a rider be safe and keep the horses as free of injuries as possible. Injuries here are compounded by the fact we have no diagnostic tools to help figure out what's wrong. NO x-ray or ultra sound and minimal knowledge of lameness experience available for help. Doing anything well means putting time and money into it, and that is not always easy here. Dollars do not just drop off the mango trees and with the fire season we have had, so much extra cash has gone into taking care we don't burn up.

On the bright side: TCER will be produced for at least one more year. The racetracks are trying to make improvements; rodeos seem to be more frequent, but everyone who has an interest in any equine event needs to support them. Financial sponsors are always welcome but human time and energy are also greatly appreciated, as well as participation with your horse.

#### Horsemen's Club

In late 2010, John Roberson Sr. and I discussed creating a "Horseman's Association of Belize." The association would band together all horsemen in the hopes it would keep us more updated on events, help with legislation and laws governing horses and all that goes with it, such as BAHA and getting vaccines and horses in and

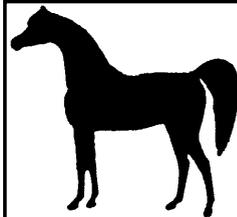
out of the country, and being able to pool our resources together to help all horsemen no matter what they do with their horses. You are always stronger as a group than as an individual and ideas and energy from others can only be a good thing. Just sharing information with each other can make a big difference in making life easier and making my horses' lives better, which is a big attraction to me.

I think at this time I would like to create a "Horseman's Club of BZ" as I do not want to spend dollars on lawyers setting up bylaws and association rules until I know it is going to be a worthy expense. But, the idea behind it is that we have a bi-annual to quarterly newsletter with lists of members and information they want published, such as what they have at their farm, studs and horses for sale, the type of training they do (like roping or trail horses), whether they make tack or sell feed or have a trailer for rent or haul livestock; *anything that is equine related* would be included. We would also have a website with a sales page, an info page, links to many sites that could be informative and email list with notices going out for any event. The main thing would be communication amongst all of the horse people of Belize and a way for newcomers to this beautiful country to know whom to contact in the area they are planning to live. Printing is so expensive, that we need to utilize the cheapest communication possible and that, folks, is the WEB!

How many of you know that there is a "Belize Arabian Stud Book Registration"? And that there was a rodeo in Belmopan a few weeks after the NATS? I had not heard about it till it was over! We did a ton of advertising for the TCER and still had people say they did not know about it. So, this won't be just a Cayo thing; this will be countrywide! Yes, we will have to have a membership fee and advertising fees but we will make it as affordable as we can.

So anyone interested in the "Belize Horsemen's Club" please let me know. My phone is 663-4609 (texting works best or leave a voice mail) and email is Shotzy08@live.com. Or you know my vehicle; stop me and talk. It may take a while to get organized, but I think this could be a really good thing for all of us!

Have a wonderful summer, be safe and "Never sell your saddle, cause life's a long, long ride."



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

## Approximate number of trees per acre

(rounded to the nearest whole tree)  
based upon the spacing distance between trees in feet.

	1ft	2ft	3ft	4ft	5ft	6ft	7ft	8ft	9ft	10ft	11ft	12ft
1ft	43,560	21,780	14,520	10,890	8,712	7,260	6,223	5,445	4,840	4,356	3,960	3,630
2ft	--	10,890	7,260	5,445	4,356	3,630	3,111	2,723	2,420	2,178	1,980	1,815
3ft	--	--	4,840	3,630	2,904	2,420	2,074	1,815	1,613	1,452	1,320	1,210
4ft	--	--	--	2,723	2,178	1,815	1,556	1,361	1,210	1,089	990	908
5ft	--	--	--	--	1,742	1,452	1,245	1,089	968	871	792	726
6ft	--	--	--	--	--	1,210	1,037	908	807	726	660	605
7ft	--	--	--	--	--	--	889	778	691	622	566	519
8ft	--	--	--	--	--	--	--	681	605	545	495	454
9ft	--	--	--	--	--	--	--	--	538	484	440	403
10ft	--	--	--	--	--	--	--	--	--	436	396	363
11ft	--	--	--	--	--	--	--	--	--	--	360	330
12ft	--	--	--	--	--	--	--	--	--	--	--	303



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## The Growth of Westrac: A Reflection of the Growth of Agriculture

By Dottie Feucht

The agricultural tradition of the settlers of Spanish Lookout was drastically interrupted when they came to Belize (still British Honduras) in 1958. They had been used to mechanized farming but before they could resume farming as they were used to, they had to clear the land and determine what



crops they could grow in this semi-tropical land. According to the book *Pioneer Years in Belize* by Gerhard S. Koop, which describes the month-long effort to transport their household effects and trucks, only one tractor, belonging to Peter D. Reimer, was loaded on the flatcar with the freight. The history of Westrac began as a tractor parts business soon after the settlers arrived. On page 70 of *Pioneer Years in Belize*, G. S. Koop writes: "Mr. Daniel D. Plett probably has the largest selection of tractor parts on the colony. Farmers repair their tractors in his shop while Mr. Plett supervises the repairs." In the chapter on Agriculture at Spanish Lookout Abe D. Loewen writes: "We bought old, inexpensive and used farm machinery. It was repaired and then used on our fields. Threshing machines were built on the colony from wood and iron. .... By 1968 many new tractors had been purchased and soon everyone had their own."

In 1969 Westrac was known as Western Tractor Supply and tractor parts comprised most of the business; by 1985 they added car/truck parts to meet the demand. Soon the volume of business for auto and truck parts exceeded that for tractor parts; so the name was changed to Westrac in 2002. Westrac still does a greater volume of business in auto and truck parts than tractor parts because of the significant increase in automobiles and trucks in Belize.

In 1985 Western Tractor Supply had a 900 square foot building. In 2003 they expanded to Belmopan, in 2005 bought out Belize Industrial Agencies, expanded the building in Spanish Lookout and now have over 33,000 square feet for their business. They've come a long way from Mr. Plett supervising tractor repairs in his facility. They have some 70 employees.

Mr. Albert Penner recalled from their history that one of the first imports was a Massey Ferguson from the UK. John Deere tractors became their specialty when they bought the parts dealership in Belize City. Mr. Penner said that they didn't even have an unloading ramp at their Spanish Lookout facility for unloading the first John Deere, which came from Germany. It wasn't until the late 1990's that they began importing volumes of John Deere tractors. They are imported from Mexico, USA, and Germany. Parts for these tractors mainly come from the US.

John Deere tractors that are used in Belize are not the large ones used by the farmers in the Midwest of the U.S. They are in the 90HP utility tractor range and most are open station because citrus growers, who are the biggest customers, cannot use the closed cabs in their orchards where tree branches can scratch or break the windows of closed cabs. Row crop farmers use bigger tractors, 100-300 HP, for their larger fields.

Westrac's current inventory includes 9 farm tractors and 20 lawn tractors. The lawn tractors were added to meet the

demand for mechanized lawn care. Used tractor sales are becoming a significant part of their business because John Deere tractors typically retain their value longer than other brands. They can easily last 20 years in Belize. Most of the used tractors come from the U.S. Mr. Penner estimates that there are over 200 John Deere tractors in operation in Belize now, representing about 33% of all tractors here. It is not easy to determine the number of tractors in use because they are not required to be licensed unless they are driven on public roads. However more and more tractors are being licensed because farms are expanding to rented land and non-contiguous field locations.

## Cattle Sweep Progressing

By John Carr, BLPA Chairman

At a recent National Livestock Cattle Sweep meeting some final plans were discussed concerning the Livestock Sanitary Program- this means that every bovine in Belize will receive (2) I.D. ear tags, which will act like a passport. The tag numbers will be entered in a computer along with the animal's basic information (sex, age, etc) along with any new births, death, exports, change of ownership, and change in location will be recorded. At the same time a brucellosis (cattle VD) test and a tuberculosis test will be done, this will involve every cattle owner in Belize. To conduct this program, the animal will have to be restrained, preferably in a chute (can be made from bush stick). Hopefully we can start in the summer or early fall.



This process requires a huge financial input from several sources: the European Union will put in \$2.2 million Euros or Bze \$6.116 million. The Ministry of Agriculture will put in Bze \$3,497,093, SENASICA from Mexico will put in Bze \$400,000 and Belize Livestock Producers Association will put in Bze \$2,100,000. All of these funds are budgeted over 3 years. This totals \$12,113,093 Bze. We estimate a cattle population of 100,000 head and that comes to \$121.00 Bze per head for the 3 year programs. Each producer will be asked for \$10.00 per head when we test (per year). We need to check the cattle for 3 consecutive years. A livestock owner will receive a \$121.00 value for \$30.00. In addition, that owner will be asked to help and cooperate in this most valuable program.

This sweep will allow us to export cattle legally (primarily we hope to begin exporting to Mexico and other neighboring countries as well). Every country requires this sweep in order to allow importation. There are international cases where contagious diseases spread like fire and whole livestock industries have failed by liquidation. Cattle have recently gone up 5 to 10 cents per lb depending on quality and condition, which means up to a \$100.00 increase per head. All or most of this is a result of exportation by informal trading. When we finish our sweep, we think cattle will bring 20 to 30 cents a lb more and result in an increase of \$200 or \$300 per head. This program is happening in almost every country in the world and if we want to make a living with cattle, profit and expand, we must participate. We thank the E.U., MoAF, SENASICA, BLPA and especially all of the Belizean Cattle Producers.

## Belize Corn Acreage Expected to Increase

By John Carr

Farmers who raise corn are looking at “How to Plant More Acres.” The U.S has had unexpected floods, rains and even late snows that are causing delays in corn planting. The Missouri River run-off which goes into the Mississippi is 178% above normal. The state of North Dakota has received 100 to 300% of normal precipitation. Because of their winter freeze, they have a cut-off corn planting date that is usually June 5<sup>th</sup>.



The USDA 2011-2012 corn yield projection is 12.906 billion bushels (a bushel is 56lbs) while the demand is 13.355 billion bushels. This leaves an annual difference between projection and demand of 449 million bushels. They had a 900 million bushel carry over so while they don't expect to run out of corn, their year-end carry-over is the lowest on record. They project a 158 bushel yield average (8,848 lbs) per acre. In Belize we average 4,000 to 5,000 lbs per acre. The United States has increased yields by some 30% by being able to use transgenic seed. Hopefully Belize will soon consider a policy change.

Corn prices have increased in Belize from 18 cents (BZE) a lb. to 35 cents a lb. Farmers were losing or at best breaking even at 18 cents and are making profits at 35 cents. Senator Godwin Hulse stated at the NATS opening that Belize has 60% of its land suitable for agriculture: that is, for either crops or livestock. He believes we are using some 10% of our potential. It is profits that drive expansion on all fronts. Development for land preparation and machine infrastructure is very expensive and is a result of profits and in some countries it is supported by subsidies. Some costly barriers in Belize include farm inputs in seed, fertilizer, fuel, butane and especially interest- 12 to 14% are some of the highest in this hemisphere and tends to curtail production.

Corn farmers must export either whole or processed corn; otherwise surpluses and losses will occur. That will be accompanied by low prices and slow or no expansion. It seems that Guatemala, El Salvador, Honduras, Mexico and especially the Caribbean are all eligible buyers of our surplus. **We have the potential to be the “Corn Basket” of Central America and the Caribbean.** We hope that the Ministry of Agriculture will show export farmers their support by lowering interest, creating new seed policies and establishing fuel breaks (like the cane farmers get). We believe a doubling of acreage planted in corn is possible in the next 5 to 7 years. All of this will cause lower prices, lower production costs, a higher amount of exports, more jobs and help toward correcting our balance of payments.

## Grid-Tied Solar Power – a Winning Idea for Belize

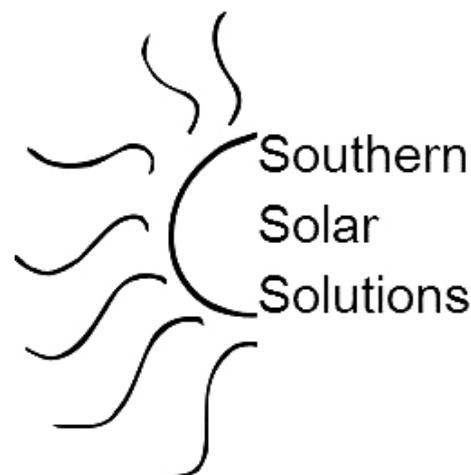
by Mark Miller

Belize is a growing eco-tourism destination with beautiful natural resources and plenty of sunshine. It's the sunshine that we can use to develop grid-tied solar power to reduce our heavy reliance on imported electricity powered by diesel and other fossil fuels, enhance our tourism industry, our economy, the reliability of our electric grid, and our sovereignty as a nation. What is grid-tied solar power and how can it help solve these issues?

Solar Power has two basic forms – heat and photovoltaic. Photovoltaic means that the solar power is converted to electricity. That electricity can be used in three different types of systems: (1) direct use such as water pumping or running a fan only when the sun shines; (2) remote systems that use batteries for power storage so that power is available when the sun does not shine; and (3) grid-tied systems that complement BEL's other generation sources. A grid-tied solar system is made up of solar panels that turn light into DC electricity, fuses and circuit breakers for safety, a grid-tied inverter, and one or two electric meters to facilitate feeding your solar energy into the BEL system. These systems are very common in many countries across the world.

It's more efficient to be hooked to the utility grid because off-grid systems must store the energy in batteries which lose energy and need regular replacement. If you are on the grid, the utility company keeps track of the kilowatts you use. In a grid-tied system the electricity produced from your solar panels lowers the amount of kWh you need to buy from BEL. During bright sun, you can produce more energy than you use so you are effectively selling electricity to BEL. When it is not as sunny (including at night) you buy electricity from BEL.

If your system has one meter, it is called net-metering, because the meter runs in both directions and at the end of each month simply tells you whether you bought or sold more power. Net metering is beneficial to consumers as you effectively get the same sales price as you pay. However, net metering does not adequately pay BEL for the use of their grid; so they need to



*Continued on page 22*

## Belizean "Green Pea"

By Dr. Mandy Tsang

I have been fortunate enough to have had a diversity of culinary experiences in my life not to get "stuck in mud" over the need for "familiar" vegetables like broccoli, cauliflower and spinach. Having a Chinese background, I grew up with bok choy, kai lan, pickled mustard greens, bitter gourd and a whole plethora of greens I cannot even name but would recognise them at Mile 23 Taiwanese supermarket outside Belize City. In amongst this, I had to stomach over-boiled cabbage that smelt distinctly of smelly socks with mince and tatties (potatoes) for school dinners during my primary school years in Scotland. These experiences have combined to give me an "iron stomach" (I think this was largely due to the cabbage) and a sense of adventure to eat anything exotic. And so, when people ask me if I miss any of the vegetables I grew up with I can confidently say "NO!" I am not desperate enough for broccoli to wait the nine month growing period, but, on the contrary, would much rather stick chaya in the ground and start harvesting in four weeks time.

When I first came to Belize about seven years ago, I wanted to import exotic vegetable seeds to grow in my garden and so went through all the necessary paperwork and even paid USD \$100 for the phytosanitary certificate because it was so important to me. The post-master at PG post-office nearly fell off his chair and beamed with administrative pleasure when he perused over the first phytosanitary certificate he had ever seen in the course of his long career as post-master. And now I am getting to the actual story; one of the seeds I brought was "Thai Green-Pea" which is described as an exotic egg-plant which produces green-pea like vegetables and is



considered a delicacy in Thailand. It is a well sought after vegetable amongst the Thai community, so much so that it is even imported to London vegetable markets exclusively for the Thai community. Over time I grew this vegetable and I had bumper harvests. The "peas" are green in colour and grow to about one centimetre in size and the leaves are 20-25cm long with prickles; the white flowers have bright yellow stamens and occur in clusters. My plants grew up to 120cm, bushed out and took over the whole garden. We were eating the "green peas" every day (steamed/stir-fry/sauté/cooked in curries and stews). The peas are eaten more as a texture - somewhat like biting into a soft rubber ball and do not really have a distinct taste but rather absorb the flavour of whatever you cook with. At about this time, I happened to be walking on shrub-land on my farm ("huamil") when I spied a plant with little white flowers and green pea-like fruit growing to a height of 60cm and apart from the height, in all other respects looked exactly like the Thai Green Pea I was cultivating in my garden.

After some reading up, I discovered that this "exotic plant" is native to the Belize and Caribbean areas. The Latin name is *Solanum torvum* and is known commonly as "wild eggplant." I am not aware of anyone harvesting this as a vegetable in Belize but it is used in Jamaica as a vegetable combined with salt first. In the Caribbean countries it is used as a rootstock for grafting tomatoes and cultivated eggplants (this might be our answer to bacterial wilt to which our tomatoes suffer from down here). In Caribbean herbal medicine, the root is an ingredient in a tea to treat gonorrhoea and the buds are used in tea to counteract influenza. Well, what a surprise to go to all this trouble to bring in an exotic seed from Thailand to then find it growing virtually on my door-step! I really learned my lesson here, there is truly an abundance of vegetables in this country if we only take the trouble to look! Nowadays, we mostly eat chaya, calaloo, loofah, giant granadilla and of course, our very own "Belizean Green Pea!"



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**Part 2 of Green to Greening to Guava and back to green: Companion Planting Continued from part 1 printed in issue 11 New Commercially-Viable High Density Intercropping**

The only ways to eliminate HLB are to (1) prevent its entrance into the pristine grove at the outset, (2) eradicate the carrier vector (ACP), and (3) remove diseased trees. Recently, a promising natural alternative to the use of insecticides was noted in citrus groves in Viet Nam. Citrus trees are raised in groves containing guava and other fruits. Vietnamese, Australian and Japanese researchers reported that inter-planting of citrus and guava negated infestations of ACP. (D.G. Hall). Observations of inter-planted orchards show that these orchards were productive past 15 years with little HLB. Those orchards mono-cultured in the same area died within 3 years in the face of HLB.

In the new grove paradigm, grove management would consist of three integrated elements: (1) inter-planted blocks of selected other 'repellent' species and unique 'attractant' varieties, (2) higher density planting, and (3) specific pest management cycles coupled with increase in natural predators of the vector. In the HLB pathosystem, the primary infection is the most difficult to control, as it is caused by the entrance of the primary vector (ACP) from the outside entering the groves. Planting repellent and/or attractive species on the boundary of the grove may diminish the border effect.

Intercropping alone does not represent an efficient control method of the vector. What it does is diminish the presence of the vector, and/or concentrate the vector on the attractive trees or the 'bait' so that the insecticides can be applied judiciously.

Intercropping broadens productivity, increases biological diversity, reduces economic risks of agriculture, and increases the income of the grower through time. In the presence of HLB, the use of intercropping has major viability since it reduces the risk of the activity (such as is present in monocropping) and leads to higher income if well executed.

Citrus is responsive to high density spacing. What is now industry convention at 7 to 9 m between rows and 4 to 6m between trees might become 5 to 7m and 2 to 4 m. The HLB-free Vietnamese farms in Mekong delta are densely planted at 2.5m x 2.5m. Most inter-planting are equal numbers of citrus to guava, at 1.5m x 1.5m spacing. No heavy equipment is used. Higher density compensates for eradication of plants from HLB and has been used in China for some time. High density from the outset also avoids setting new treelings, which are highly susceptible to HLB.

**Guava, the Fruit of Choice**

Citrus groves inter-planted with guava trees were found to be free of greening disease, while citrus groves inter-planted with only bananas and pineapples were found to be infected with the disease.

The guava is a small tree that is thought to have originated in Central America. The plant belongs to the myrtle family, which also includes other species known for their insect-repelling essential oils and antiseptic compounds, for example, eucalyptus, tea trees, and clove. Guava trees are widely grown in the tropics for food and medicinal purposes. The guava tree has a long history of traditional use of bark and leaf extracts that have an in vitro toxic effect on numerous bacteria. Guava extracts are used as herbal antibiotics with significant antibacterial, antifungal, anti-yeast, anti-amoebic, and anti-malarial actions. The leaves of guava are rich in essential oils and flavonoids.

Guava, like other plants in the same family, is known to emit copious amounts of volatile compounds. There are over 240 volatile compounds that have been identified in guava trees. It is suspected that the presence of sulphur-derived substances (DMDS) in the guava leaf acts as a repellent to psyllid. Such compounds, are not synthesized by the citrus, and perhaps explains the lower incidence of psyllid, and therefore the less incidence of HLB in the groves. Vietnamese farmers working in intercropped groves have found that they need to spray only with vegetable oils when minor outbreaks of insects occur and that toxic insecticides are not needed.

Mangos (*mangifera indica* L.) are a possible non-preferred species of psyllid. Orange jasmine (*murraya paniculata* (L.) jack) is the preferred attractive host to the vector. Intercropping with the last two species empirically tested in the field resulted in a 96% to 74% decrease in HLB compared to mono-cropped groves.

One key point to understand is the researchers do NOT know the mechanism by which the intercropping with this species works to reduce or eliminate the population of ACP. It just WORKS. There is NO to little greening in the mature groves in Vietnamese orchards that have implemented the intercropping. On the other hand, the Brazil model continues to remove large numbers of tree each year and has not eradicated the incidence of the disease, and further admits that its protocol is not a sustainable solution for the industry.

**For Belize Growers**

Based on the scale of citriculture in Belize, and the field work conducted globally, this polycrop system appears to be a pragmatic solution to the control of the vector, ACP, that transports the bacterium (eventually infecting 90% of the grove) and therefore, assures the long term productivity of the orchards.

The additional benefits of intercropping are several. A second crop is produced in the off season of citrus, offering a consistent labor profile throughout the year. The reduced use or elimination of costly chemical sprays increases the bottom line, leaves a safer environment, enhances habitat for friendly insects, and restores a natural ecosystem. Basic cursory research shows a healthy market for guava products. To mention a few: juice, wine, membrillo dulce, jams, chutney. All are value-added products.

**Wish to intercrop existing and new groves in Belize?**

With proper evaluation, planning, spacing calculations and resultant drawings, the grower can restructure the planting/thinning/intercropping on his existing and/or new farm.

Potentially interested growers that wish to investigate this system further, please contact Dr. Stephen Williams at 522 3535 x 242 .... or Maruja Vargas at 600-2853.

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## Coffee Grounds in the Garden

By Kim Ringland

Coffee. Most of us have at least one cup a day. Personally I like the brewed type, but the grounds seem to be such a waste and bother. They are no good for another cup, so what do you do with them?



Those coffee grounds are an amazing addition to your garden. They are composed of 1.45% nitrogen, magnesium, calcium, potassium and many trace elements. As a fertilizer coffee grounds are good for flowers, vegetables, trees and shrubs. Spread them around individual plants or add them to the soil before you plant your seeds. Try top dressing your rows of growing crops. You can brew a compost tea out of 2 cups of grounds to 5 gallons of water. Brew overnight. Use it to water you house plants and garden. Watch the results! It is even good as a foliar feeding; so spray it on the leaves in the evening.

Acid-loving plants particularly benefit from the addition of coffee grounds. Some of these are palms, hibiscus, gardenias and most flowering or fruiting plants. Flowers become brighter and larger. The fruits are more plentiful and of better quality. Use coffee grounds as a top dressing around each plant and water as usual.

Coffee grounds are excellent in the compost pit. They are a favorite food for worms causing them to consume the solids in your compost and garden at a faster rate. (If you don't have any worms get some. Then you'll have worm castings in your garden as well.) Slugs, snails and even ants seldom cross a ring of grounds 1 inch wide and 1/2 inch deep because of the high acid and abrasive nature of coffee grounds. Refresh as often as needed.

If you happen to have access to a lot of used coffee grounds, use them to kill the grass alongside chain link fences. Pile a line of grounds at least 2 inches high along the fence. Water it daily and watch the grass die. The acid and nitrogen are too strong for the grass and burn it. After the grass dies I spread the remainder out in the lawn or pile more of my grounds on top of the old ones.

The texture of coffee grounds makes them the perfect match to our Cayo soils. They break up the heavy clays and give the sand water-holding qualities it lacks naturally. The coffee grounds decay and cause beneficials to grow as well as create air pockets for the roots of your plants. Bigger, happier roots = bigger, happier plants. That is a joy to a gardener!

These are only the garden benefits of coffee grounds. I haven't touched on other uses. If you want to know more go on line and search "uses for coffee grounds." Amazing! So don't drink the instant type; brew a pot of joe and use the grounds to beautify Belize. Start putting them in the garden and watch the results.

## Solar power, Continued from page 19

make up that cost elsewhere in the system. If your system has two meters, one records your sales to BEL, and one records your purchases from BEL. This allows two different prices to be set for the price of power.

The cost of bringing electricity to your home can be broken into 3 components: transmission – the moving of large amounts of high voltage power to key points around the country; distribution – the moving of medium voltage power into neighbourhoods; and generation – the making of the electricity. As a solar grid-tied system is a generation system, it definitely competes with the imported electricity from Mexico. It also has distinct advantages over the power from our friendly northern neighbour. Grid-tied systems are generally sized to produce near the amount of electricity that a home or business uses each month. For homes this may be a system up to 10kW and for hotels, resorts, large farms, and other business somewhat bigger than that based on their power use. As this places many small solar systems around the country, the power generation is said to be distributed. This is advantageous to BEL as less power needs to be transmitted to the various distribution networks, thus saving some transmission costs.

Another advantage of grid-tied solar is that the power is produced when the sun shines, which is the same time as our electricity use is at its highest, as businesses and tourist destinations have their air-conditioning running most when it is hottest. It is at these times that we currently need to purchase the most power from Mexico, and the power from Mexico is more expensive than the power from our in-country sources such as the hydro-electric dams.

Remember that any time we send money to another country, it hurts Belize's balance of trade and weakens our economy. Grid-tied solar can help us be more independent and better placed in the world marketplace.

Our tourism industry is based mainly on our beautiful sea, rivers, and forest. Solar power can play an important role in improving the marketing of this important segment of our economy. Solar power does not produce greenhouse gases, thus Belize can send a message to the more developed countries of the world that we are concerned about *global climate change*, and if we can take this step, surely the wealthier countries can do even more.

Grid-tied solar is not cheap to establish; it represents a significant investment for the home or business owner. But it is an investment that can pay for itself over many years, thus saving money over time. It is now time to allow market forces to improve our electrical system in Belize. BEL wins, the economy wins, the home and business owners win.

We strongly encourage BEL and GOB to start allowing and promoting grid-tied solar power for homes and businesses.

By Mark Miller, Southern Solar Solutions, Punta Gorda Town, [solarbelize@gmail.com](mailto:solarbelize@gmail.com)



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**"To the Editor" continued from page 5**

company. Most alarming, they are prohibited from examining whether the genetically modified crops lead to unintended side-effects either in the environment or in animals or humans. [www.globalresearch.ca/index.php?context=va&aid=14570]

This leads me to wonder where Mr. Redmond is getting his "rigorous testing" results, if not from the fox who guards the henhouse.

The U.S. Secretary of Agriculture, a former governor of the big farming state of Iowa was in Iowa at a public meeting reported in the *Huffington Post* at

[www.huffingtonpost.com/jeffrey-smith/vilsack-mistakenly-pitche\\_b\\_319998.html](http://www.huffingtonpost.com/jeffrey-smith/vilsack-mistakenly-pitche_b_319998.html)

Jeffrey M. Smith, a consumer non-GMO activist, was in the audience and asked Secretary Vilsack:

"The American Academy of Environmental Medicine this year said that genetically modified foods, according to animal studies [www.responsibletechnology.org/utility/showArticle/?objectID=2989], are causally linked to accelerated aging, dysfunctional immune regulation, organ damage, gastrointestinal distress, and immune system damage. A study came out by the Union of Concerned Scientists [www.ucsusa.org/food\_and\_agriculture/science\_and\_impacts/science/failure-to-yield.html] confirming what we all know, that genetically modified crops, on average, reduce yield. A USDA report [www.ers.usda.gov/publications/eib11/eib11.pdf] from 2006 showed that farmers don't actually increase income from GMOs, but many actually lose income. And for the last several years, the United States has been forced to spend \$3-\$5 billion per year [www.soilassociation.org/LinkClick.aspx?fileticket=6lQJZLPalqo%3d&tabid=390] to prop up the prices of the GM crops no one wants. And are you willing to take a delegation in D.C. to give you this hard evidence about how GMOs have actually failed us, that they've been put onto the market long before the science is ready, and it's time to put it back into the laboratory until they've done their homework."

The guardedly pro-GMO response from the Secretary was met with a negative response from the audience. As the *Post* reported, "the people in the room were among the top experts at *actually* feeding the world. They included numerous PhDs who had spent their careers looking deeply into the issue. Among those present were several of the authors of the authoritative IAASTD report [www.agassessment.org] the most comprehensive evaluation of world agriculture ever prescribed the methods that were *now* needed to meet the development and sustainability goals of reducing hunger and poverty, improving nutrition, health and rural livelihoods, and facilitating social and environmental sustainability. **And GMOs was not one of those needed methods!** It was clear to the experts that the current generation of GMOs did not live up to the hype continuously broadcast by biotech companies and their promotional East Coast wing - the federal government." (font styles in original)

Smith has authored *Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods*. About the author, Candace Pert, PhD, formerly a section chief at the National Institutes of Health, wrote: "Jeffrey Smith is the leading world expert in the understanding and communication of the health issues surrounding genetically modified foods. *Genetic Roulette*, which brings in original contributions by eminent scientists

worldwide, makes it crystal clear that the American FDA should not be so cavalier about the potential dangers of these procedures." One proponent of this book is Kirk J. Azevedo: "When I worked at Monsanto, I warned both scientists and executives that our GM foods may cause disease, but no one was even willing to listen, let alone investigate the unpredicted side effects. For them, it was all about profit." Samuel S. Epstein, MD, professor emeritus of Environmental Medicine, University of Illinois at Chicago, regarded the book as "The most comprehensive, well-documented, and highly readable exposé on the serious health dangers of GM foods."

"Indian farmers have turned against GM seeds after a proliferation of suicides. This is completely false. How come the number of small farmers who use Bt cotton have increased?"

In Indian agriculture activist Vandana Shiva's introduction to her book, *Stolen Harvest: The Hijacking of the Global Food Supply*, she writes: "What the industrial economy calls 'growth' is really a form of theft from nature and people." She then describes in some detail agricultural activity in India, including the 400 suicides of Bt (GMO) cotton farmers from crop failure. The larger point is that GMO sales claims are conditional at best regarding crop yields or profits to the farmer, and the suicides of hundreds of Indian farmers is but a case in point. The efficacy of GMO is not measured, scientifically at least, by the number of people who are swayed by the advertising, even in India.

"The European Union, after careful study, has opened its borders to GM foods."

Quite incorrect. Although Spain is the most deeply infected by GMOs, they are currently a hot issue of dispute within the EU. They are highly regulated to the point where only a couple of product types are currently in use elsewhere. Some countries, such as Bulgaria, have banned GMO entirely, and others, like Poland, are considering it.

Mr. Redmond failed to address the major GMO *sociopolitical* consequence of control of the food supply. Jeffrey Smith has not ignored it in another book of his, *Seeds of Deception: Exposing Industry and Government Lies About the Safety of the Genetically Engineered Foods You're Eating*. The despicable behavior of Monsanto, which would adversely affect Belize agriculture were their GMO seed grown here, is documented in *The World According to Monsanto: Pollution, Corruption, and the Control of Our Food Supply*, by Marie-Monique Robin. Sixty American farm families are suing Monsanto in the following case:

[www.pubpat.org/assets/files/seed/OSGATA-v-Monsanto-Complaint.pdf](http://www.pubpat.org/assets/files/seed/OSGATA-v-Monsanto-Complaint.pdf)

It was filed by the Organic Seed Growers & Trade Association, et al. v. Monsanto, in federal district court in Manhattan. Plaintiffs in the suit cover a broad sampling of family farmers, small businesses and organizations from within the organic agriculture community who are increasingly threatened by genetically modified seed contamination despite using their best efforts to avoid it. The plaintiff organizations have over 270,000 members, including thousands of certified organic family farmers.

I hope these website and book references will help Mr. Redmond and others to gain a better understanding of the dangers and false claims currently advertised for GMOs.

Dennis Feucht

## Continued from page 1

Brown eggs are more expensive than white eggs because the chickens that lay them eat more than those that lay white eggs. The breeds that lay brown eggs are all larger birds that require more food. Additionally, the brown eggshell is tougher and does not break as easily. However, the white egg layer will lay more eggs than a brown egg layer but with a shell that is easier to crack. In Belize this is an important transportation consideration due to the large number of bad roads that delivery trucks have to travel on.

### Differences Between Commercial and Backyard Layers

**Commercial:** Commercial layers are those fed under special conditions of housing and full commercially-mixed rations designed for the various stages of development and also for the laying period. They are kept in cages of 4-5 birds per cage, and lay in the cage; their eggs are manually or automatically collected. Total mixed feeds, especially those in the early stages of the chicken's life, can contain some antibiotics, probiotics (beneficial bacteria) and other ingredients to help the bird's digestive system to adapt to various challenges and thus increase the efficiency of digestion, especially nutrient absorption resulting in better growth and production.

**Backyard:** Backyard layers are either free-range or free-run. Free-range layers have the ability to exercise by having access to an open space. They also utilize nesting boxes and perches. They usually have access to commercial feed. They may also be fed with corn, rice, other cereals or be left to find their own food if they have sufficient space to walk and peck on other available food in pastures and backyards.

Free-run hens are allowed to roam freely in an enclosed facility. In Belize, many of our backyard birds have a fowl coop with a roost to sleep at night and then are let loose during the day.

### Differences in Eggs

**Freshness:** What really matters is what is inside the shell rather than its color. One of the biggest differences can be *freshness*. A fresh egg tastes better than anything sold in the supermarket that has been stored for a week or more, whether the egg is commercial or backyard. Eggshells are porous. As an egg ages, carbon dioxide contained inside the egg is released, and odors outside the egg are absorbed. This is why you should always store eggs in clean, covered containers and not near onions or garlic sauces while in the refrigerator. Other changes in the egg happen as well. As an egg ages, the white (albumen) and yolk become thinner. You'll notice a big difference when you fry a fresh egg—the white will barely spread and you won't have to worry about the yolk breaking. The yolk is firm and almost centered around the white. The only time you don't want to use the absolute freshest eggs is for hard-cooking, because eggs that are less than a week old are almost impossible to peel. It takes a few days after laying for the membrane that separates the shell from the white to detach, and you need that membrane to peel the egg smoothly.

The best temperature to store eggs is between 40 and 45° F. An egg left at room temperature for one day will age the equivalent of an egg kept for one week in the refrigerator. In the heat of the dry season, it is recommended to collect eggs at least twice a day. Eggs are best consumed within two weeks of laying, but remain edible weeks longer.

**Flavor:** Flavor can also be a difference. Backyard eggs may have a better flavor depending on what the bird eats. Hens are omnivorous; they'll eat just about anything—including bugs,

table scraps, worms and weeds. A diet that includes green leaves imparts that bright yellow-orange color to the yolk that is so indicative of the backyard bird. It also lends flavor. Milk absorbs the flavor almost entirely from what a cow consumes (garlic, onions etc.) due to the fatty acids in milk. Eggs are like that too, but not as pronounced and thus the effect is more subtle.

**Nutrition:** Nutrition is derived from the diet of the layer. There are three types of eggs called *specialty eggs* based on the diet of layers:

*Omega 3-enhanced eggs* are produced from hens that are fed a diet consisting of flax seed, linseed, grass, fruit, and corn; thus the hens produce eggs higher in omega-3 fatty acids.

*Vitamin-enhanced eggs* are produced by hens that are fed a diet which are nutritionally enhanced with vitamins B-6 & B-12, vitamin E, folate and lutein.

*Organic eggs* are produced by hens fed entirely from organic foods. The production farms of organic eggs must be certified by an organic certifying agency.

**Other Egg Nutrients:** The nutritional composition of the egg, whether backyard or commercially produced, does not change very much unless it is one of the specialized eggs. Backyard hens produce eggs with a higher content of omega 3, 6 and 9 fatty acids. The color of the yolk is largely based on the amount of green leaves, yellow corn or other feeds containing high levels of the yellow-orange colored pigments (Xanthophylls) which are also precursors for vitamin A. These pigments can be added to the commercial feeds if the market demands it. The protein content of the egg does not change. A large egg of any kind still contains about 6.5 grams of protein.

**Conclusion:** While consumers will have their own preferences or choice of table eggs, the things to consider that can be potentially different are: level of antibiotic residues if the hen is fed layer feed tainted with antibiotics and off-flavor from backyard hens that have access to garlic, onion or other flavored weeds. Recent concern regarding eggs laid by backyard hens is the wide use of pesticides and herbicides and the access of these hens to pastures where pesticides are used. Hens can produce eggs with these residues. Another difference is that commercial hens are not reared with roosters and so the eggs are not fertilized eggs; thus the term "table egg". However, most, if not all, backyard layer production, at least in Belize, involves hens running together with the roosters and thus the eggs are fertilized eggs. Fertilized eggs are not nutritionally different from non-fertilized but legally are not to be marketed as "table eggs." Lastly, another factor to consider is the cost of specialized eggs which sell for much higher prices than commercial table eggs.



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