



## *Our Vision*

To be the centre of excellence in the Caribbean for the provision and application of research and development in agriculture and rural enhancement.

## *Our Mission*

To contribute to the sustainable economic well being of Caribbean people by the generation and transfer of appropriate technology through research and development within the agricultural value chain.

[www.cardi.org](http://www.cardi.org)

## Roots and Tubers (Irish potato)

**Irish Potato Programme on Track** by Judith A. Hunter, Jamaica Information Service, 8 April, 2014

<http://jis.gov.jm/irish-potato-programme-track/>

### Full Article

The National Irish Potato Programme (NIPP) is reporting that more than 1,400 tonnes of Irish potato have been reaped from 142 hectares of farm land, over the past six months.

This, as the Ministry of Agriculture and Fisheries continues to promote local production of Irish potatoes, to meet the current consumption demand of 33 million pounds per year.

According to Minister of Agriculture and Fisheries, Hon. Roger Clarke, the country is on target to be self sufficient in the production of table Irish potato by 2015. The domestic demand is now 80 per cent satisfied.

The NIPP, which was launched in October 2013, involves 2,500 farmers across nine parishes.

Chairman of the NIPP, Donald Robinson, tells JIS News that in the latter part of 2013, the Ministry convened a committee to examine the state of Irish potato production, and devise a strategy to increase production.

The programme was implemented in St. Mary, St. Ann, St. Catherine, Clarendon, Manchester, Trelawny, Westmoreland, St. James, and St. Elizabeth.

Twenty-five million dollars was spent to get the initiative off the ground with funds from the Ministry, and the Rural Agricultural Development Authority (RADA).

Support also came from a number of sponsors such as Newport Versan, which contributed 100 bags of fertilizer for the Women and Youth Programme; Agro Grace; St. Jago Farm Supplies; Gladstone Berry Potato Corp; T. Geddes Grant; and the Canadian Hunger Fund.

The Canadian Hunger Fund supports the NIPP by assisting with training.

“All farmers who are part of the programme are required to participate in the training...an integral part of this programme. The extension officers are mandated to plan, organise and conduct at least four sessions within their farming districts,” Mr. Robinson explains.

The training sessions include: land preparation; preparation of planting materials; fertilizer, pesticide, and fungicide application; proper crop care management; and post harvest management.

“We have established two half acre demonstration plots in two of the major crop areas in St. Ann and Manchester, and we have organised some farmers in and around these two plots where we run farmer field schools, which provide training that last the entire cropping season.

“We want when these training sessions are completed, these farmers will stay together. So we are doing a number of sessions on capacity building and group dynamics exercises,” Mr. Robinson notes.

Of the 2,500 farmers involved in the programme, a total 185 women and youth are benefitting from a special treatment under a Women and Youth component of the programme. Forty hectares of land have been allocated to these individuals, who will also receive full grant funding and other support to aid in the planting of the crop.

Twenty-six year-old beneficiary, Tanisha Edwards, from Carron Hall in St. Mary describes the Women and Youth component as “one of the best opportunities for ladies and young people, because it is hard for us to get jobs. It is a good initiative that the Government must be commended for.”

“When you go certain places there seems to be the gender thing going on. So I want persons to come and look now, come and see what the females are doing. It is such a wonderful programme. I will encourage women and young people to be part of it. Imagine you can do your own thing and you are getting help to start your own business,” she adds.

Alva Anderson, a 29-year-old farmer from Castle Kelly in St. Ann says the programme has helped him to expand his Irish potato farm.

“I am now farming one and a half acres, up from half acre. I think the programme is very very good; it is helping a lot of young men and women in my area to better our lives. I planted five 50lb bags of Irish Potato last crop season and I reaped twelve 50lb bags from each bag that was planted.

“I plan to expand, gradually, as I learn the techniques and the processes. This is a career that gives you independence. It teaches you how to be an entrepreneur, it teaches self reliance, and it encourages discipline and focus,” Mr. Anderson adds.

Irish potatoes are reaped 12 to 14 weeks after planting. The longer the crop stays in the ground, the greater the yield. The NIPP Chairman is, therefore, encouraging farmers to ensure that crop care programme is at its peak so that they can get maximum yield.

“We are doing some farm tours; we are moving the farmers from the Guys Hill area to Christiana to look at their best practices and to share ideas. The same thing is being done with farmers from Trelawny, St. Elizabeth, Clarendon, and Manchester, to tour the farming areas in the Guys Hill belt and we were impressed with the type of practices that the farmers have on the ground and the type of returns that they are getting,” Mr. Robinson shares.

He says the farmers are very enthused by the support from the Ministry and RADA, noting that over the past four years, the country's Irish potato imports have drastically decreased.

The Chairman pointed out that the programme is, therefore, “not only putting more money in farmers pockets, but reduces the dependency and the money spent on imports.” He informs that the medium term plan is to export Irish potato to other Caribbean countries.

In 2012, the local market demand for Irish potato reached 16.8 million kilograms, up from 15.4 million kilograms in 2011.

## Cereals & grain legumes

**New soybean germplasm line released: JTN-4307 is resistant to multiple nematode populations and fungal pathogens.** Ginger Rowsey, [The University of Tennessee Institute of Agriculture](http://www.tennessee.edu/news/Pages/NR-2014-04-NewSoybeanGermplasm.aspx), 2 April 2014, updated 10 April 2014

<https://ag.tennessee.edu/news/Pages/NR-2014-04-NewSoybeanGermplasm.aspx>

### Full Article

JACKSON, Tenn. – The U.S. Department of Agriculture has teamed with University of Tennessee AgResearch and the Missouri Agricultural Experiment Station to produce a new soybean germplasm line.

JTN-4307 is a conventional soybean that exhibits good yield potential and broad resistance to multiple soybean cyst nematode populations, reniform nematodes and Southern root knot nematode. The new line also provides resistance to fungal diseases, especially Frogeye leaf spot (FLS), stem canker and charcoal rot.

“The combination of resistance to numerous nematodes and fungal pathogens along with good yield potential makes JTN-4307 an excellent choice for parent material in breeding programs,” says participating researcher Dr. Prakash Arelli, USDA Agricultural Research Service. “It could also be a strong conventional soybean for Mid-South producers.

”Based on data averaged across 28 locations from 2008-2012 (except 2011) in the USDA Uniform Soybean Tests, JTN-4307 produced 48.4 bushels/acre (bu/a). In the Tennessee Soybean Variety Performance Tests in 2012, JTN-4307 produced seed yields of 55 bu/a.

JTN-4307 is highly resistant to SCN Races 2, 3 and 14; FLS, reniform nematodes, Southern root knot nematode and stem canker. It exhibits moderate resistance to charcoal rot as well as Phomopsis Seed Decay under normal harvesting conditions. Currently, soybean cultivars with combined resistance to SCN, FLS and other fungal diseases are not readily available.

Participating researchers from Tennessee include Dr. Fred Allen, director of variety trials for the UT Institute of Agriculture, along with Arelli and Dr. Alemu Mengistu, both of the USDA-ARS Crop Genetics Research Unit located at the West Tennessee AgResearch and Education Center in Jackson.

Seed of this release will be deposited in the National Plant Germplasm System where it will be

available for research purposes, including development and commercialization of new cultivars. It is requested that appropriate recognition be made if this germplasm line contributes to new germplasm or cultivars. Arelli can be contacted for more information at [Prakash.Arelli@ars.usda.gov](mailto:Prakash.Arelli@ars.usda.gov).

## **Banana**

**\$96.6 Million for Banana Accompanying Measures Project** by Andrea Braham, Jamaica Information Service, April 8, 2014

<http://jis.gov.jm/96-6-million-banana-accompanying-measures-project/>

### **Full Article**

The Rural Agricultural Development Authority (RADA) is to receive \$96.65 million to carry out a project to combat poverty and improve revenues in banana dependent areas.

The Jamaica Banana Accompanying Measures (JBAMS) project is being funded by a \$90 million grant from the European Union, and \$6.65 million from the Government of Jamaica.

This is set out in the 2014/15 Estimates of Expenditure currently before the House of Representatives.

The objective of the project is to combat poverty and improve revenues in the banana dependent areas, by improving the productivity and reliance of small farmers; and strengthening the link between small farmers and markets.

Anticipated targets for the 2014-2015 fiscal year include: the establishment of operational procedures such as Credit Schemes for the All Island Banana Growers Association (AIBGA); procurement of supplies for AIBGA farm stores; and the strengthening/ conversion of district branches of the AIBGA into production clusters/farmers cooperatives.

In addition, the project is expected to contract technical experts in marketing and capacity building to help strengthen the AIBGA; develop an operational manual for the production clusters; improve the infrastructure of the farm stores and other facilities; relocate oil tanks; procure equipment and containers; and construct a value-added facility.

The duration of the project is from September 2013 to March 2017. The financing agreement was signed in October 2013.

Physical achievements up to February 2014 include: engaging the Banana Board and All Island Banana Growers Association (AIBGA) to provide services to the banana industry in October. So far the Board has audited nine farms; collected and analysed soil and samples from 11 farms; collected and analysed 12 leaf samples for black Sigatoka disease; and installed pheromone traps on 18 farms.

**Noah's Ark for bananas.** Bioersivity International, 7 Apr 2014  
<http://www.bioersivityinternational.org/news/detail/noahs-ark-for-bananas/>

### **Full Article**

*The Independent* highlights the world's largest collection of banana germplasm, held in trust in Belgium. The collection, managed by Bioersivity International, contains around 1,400 samples (accessions), including some duplicates and wild varieties. This makes it the world's largest collection of banana (*Musa*) germplasm. The collection is held in trust under the auspices of the United Nations at Leuven University, Belgium.

According to Rony Swennen, the world has forgotten the sheer diversity of fruit: "There are around 1,400 varieties stored but in the developed world we eat only one. If we could bring that diversity to our plates, we could increase access to markets for developing countries and get away from the monoculture of Cavendish," he said.

The work of the International Transit Centre is supported by the Government of Belgium, the CGIAR Research Program on Managing and Sustaining Crop Collections, and the Global Crop Diversity Trust.

Read the [original article on The Independent](http://www.independent.co.uk/news/science/noahs-ark-of-the-fruit-world-where-the-banana-seeds-of-1600-varieties-are-grown-9239477.html). <http://www.independent.co.uk/news/science/noahs-ark-of-the-fruit-world-where-the-banana-seeds-of-1600-varieties-are-grown-9239477.html>

**Bananageddon: Millions face hunger as deadly fungus Panama disease decimates global banana crop.** The Independent, 6 April, 2014  
<http://www.independent.co.uk/news/world/politics/bananageddon-millions-face-hunger-as-deadly-fungus-decimates-global-banana-crop-9239464.html>

### **Full Article**

Scientists have warned that the world's banana crop, worth £26 billion and a crucial part of the diet of more than 400 million people, is facing "disaster" from virulent diseases immune to pesticides or other forms of control.

Alarm at the most potent threat – a fungus known as Panama disease tropical race 4 (TR4) – has risen dramatically after it was announced in recent weeks that it has jumped from South-east Asia, where it has already devastated export crops, to Mozambique and Jordan.

A United Nations agency told *The Independent* that the spread of TR4 represents an "expanded threat to global banana production". Experts said there is a risk that the fungus, for which there is currently no effective treatment, has also already made the leap to the world's most important banana growing areas in Latin America, where the disease threatens to destroy vast plantations of the Cavendish variety. The variety accounts for 95 per cent of the bananas shipped to export markets including the United Kingdom, in a trade worth £5.4bn.

The UN Food and Agriculture Organisation (FAO) will warn in the coming days that the presence of TR4 in the Middle East and Africa means “virtually all export banana plantations” are vulnerable unless its spread can be stopped and new resistant strains developed.

In a briefing document obtained by The Independent, the FAO warns: “In view of the challenges associated with control of the disease and the risk posed to the global banana supply, it is evident that a concerted effort is required from industry, research institutions, government and international organisations to prevent spread of the disease.”

Scientists are particularly concerned about the impact of TR4 across the developing world, where an estimated 410 million people rely on the fruit for up to a third of their daily calories.

According to one estimate, TR4 could destroy up to 85 per cent of the world’s banana crop by volume.

Since it emerged in the 1950s as the replacement for another banana variety ravaged by an earlier form of Panama disease, Cavendish has helped make bananas the most valuable fruit crop in the world, dominated by large multinational growing companies such as Fyffes, Chiquita and Dole.

But the crop – and many other banana varieties – have no defence against TR4, which can live for 30 years or more in the soil and reduces the core of the banana plant to a blackened mush.

It can wipe out plantations within two or three years and despite measures to try to prevent its spread from the original outbreak in Indonesia, it is now on the move. Such is the virulence of soil-based fungus, it can be spread in water droplets or tiny amounts of earth on machinery or shoes.

Professor Rony Swennen, a leading banana expert based at Leuven University in Belgium, said: “If [TR4] is in Latin America, it is going to be a disaster, whatever the multinationals do. Teams of workers move across different countries. The risk is it is going to spread like a bush fire.”

Another senior scientist, who asked not to be named because of his links with the banana industry, said: “There are good grounds for believing that TR4 is already in Latin America.”

The Panama fungus is just one of several diseases which also threaten banana production, in particular among smallholders and subsistence farmers.

Black sigatoka, another fungus to have spread from Asia, has decimated production in parts of the Caribbean since it arrived in the 1990s, reducing exports by 90 to 100 per cent in five countries.

Researchers say they are struggling to secure funding to discover new banana varieties or develop disease-resistant GM strains.

Professor Randy Ploetz, of the University of Florida, said: “The Jordan and Mozambique TR4 outbreaks are alarming but have helped increase awareness about this problem.”

But the large producers insist the problem can be controlled. Dublin-based Fyffes, which last month announced a merger with America's Chiquita to form the world's largest banana company, said: "While we continue to monitor the situation, as of yet we do not foresee any serious impact for UK banana supplies."

*The Cavendish: A top banana under threat*

When the world banana industry found itself in crisis in the 1950s, it was saved by a fruit cultivated in Derbyshire and named after a duke.

The Cavendish banana was grown by the gardener and architect Joseph Paxton while he was working for the Duke of Devonshire at Chatsworth House.

Paxton managed to acquire one of two banana plants sent to England in around 1830 and began growing the fruit in the stately home's glasshouses. He named his banana *Musa cavendishii* after the 6th Duke of Devonshire, William Cavendish.

The Chatsworth bananas were later sent to Samoa and the Canary Islands, providing forerunners for the variety which emerged in the 1950s to succeed the Gros Michel or Big Mike – the banana subspecies wiped out by an early version of Panama disease between 1903 and 1960.

Cavendish is now the world's single most successful – and valuable – banana, accounting for 47 per cent of all cultivated bananas and nearly the entire export trade, worth £5.3 billion.

## Small Ruminants

**T&T producing only 1 per cent of the meat consumed** by Sue-Ann Wayow. Trinidad Express Newspaper. Business Express 9 April 2014, pp. 10

<http://www.trinidadexpress.com/business-magazine/TT-producing-only-1-per-cent-of-the-meat-consumed-254469321.html>

### Full Article

To satisfy the country's growing taste for sheep and goat meat, millions of dollars have been spent on a project to increase local supply.

But despite the funding, and with less than two years before the project is to end, local farmers are still not yet sold on the benefits.

The country is the second largest importer of small ruminant meat in the Caribbean after Jamaica according to data from the International Trade Centre, a joint agency of the World Trade Organisation and the United Nations.

And Minister of Food Production Devant Maharaj said sheep and goat meat was on the top ten list of Trinidad and Tobago's imported foods.

Maharaj said: "In our efforts to reduce the food import bill, it is important that we cultivate and encourage livestock farming, in particular goat and sheep."

In 2010, US\$12,098,000 was spent importing 2,759 tonnes of meat.

Shiraz Khan, president of the Sheep and Goat Farmers Association said the country was producing only one per cent of the meat consumed.

The Caribbean Agricultural Research and Development Institute (CARDI) has stated that sheep meat is more popular than goat in the Caribbean, with people eating twice as much sheep meat than goat meat.

Bruce Lauckner, CARDI's Head Strategic Alliances/Biometrician said ethnic, cultural and religious factors greatly influenced consumption patterns.

He said a study showed fresh goat and sheep meat were consumed in the Caribbean region throughout the year with peaks associated with various celebrations and religious events such as Christmas, Eid Ul Adha and Eid Ul Fitr.

For this reason, CARDI has developed a plan to increase the production of both sheep and goat meat locally and in Jamaica.

In 2010, small ruminant meat imports into Jamaica totalled 3,654 tonnes worth a total of US\$15,958,000, Lauckner stated.

More than US\$4 million is being shelled out for the advancement of the project entitled "Diversification of the Caribbean Livestock Sector through the Production of Small Ruminants". It officially began in January, 2012 and is expected to end in December 2015.

The sheep and goat industries will not be the only one to benefit but also the local craft industry, he said.

CARDI stated in a recent press release: "This sector has the potential for significant contribution to employment generation, foreign exchange earnings/savings through import substitution, poverty alleviation and food and nutrition security. The small ruminants sector is one of the fastest growing segments of the agricultural economy in many developed and developing countries, propelled by revenue growth and supported by technological and structural changes, coupled with an enabling environment."

The main beneficiaries of the project launched in January are Jamaica and Trinidad and Tobago. Funding is available mainly from the Common Fund for Commodities (CFC), set up by the United Nations.

According to CARDI, the benefits of the project included improvement in farming and breeding techniques, training in product marketing, better prices for farmers and processors, a system from which offal, horns, hooves and tanned leather could be procured for the production of artefacts, and an overall better organised industry.

But Khan was unimpressed by the project.

He said: “It’s millions of dollars we have spent behind that project and I am wondering for what benefit. We still have the problem with very cheap imported meat coming into the country and you still have a problem where you can’t sell your meat at a profitable margin.”

He gave suggestions to boost the industry. These included having an operational “grass bank” which was especially needed during the dry season, an effective praedial larceny squad, proper consultation with farmers, a proper breeding unit and competent staff in the Ministry of Food Production.

Khan said: “We got to be able to really sit down with the farmers and come up with a good plan that would increase the sheep and goat production within the next two to three years and therefore put some strain on the amount of meat being imported into this country that will help the local farmers get up to standard. The meat that is being imported into this country is heavily subsidised and we have to contest with that market.”

**Abattoirs to be upgraded this year** by Andrea Braham. Jamaica Information Service, 8 April, 2014  
<http://jis.gov.jm/abattoirs-upgraded-year/>

### **Full Article**

An allocation of \$30.6 million has been made in the 2014/15 budget, to upgrade several of the island’s abattoirs, under the Diversification of the Caribbean Livestock through the Production of Small Ruminants project.

The project’s goal is to contribute to achieving self-sufficiency in regional meat consumption, initially through the development of the small ruminant industry; increase the availability of quality breeding stock at affordable prices; transfer/disseminate technology in the use of improved feed and feeding systems; and increase the production of meat and ancillary products from small ruminants.

In addition to the refurbishment of abattoirs, other anticipated targets for this fiscal year include: the selection and procurement of breeding animals and embryos; training of trainers and livestock producers; the establishment and maintenance of improved management system for feeding, housing and animal husbandry; and demonstration/training in meat processing and by-product refinement.

The project began in April 2012 and was to have ended in February this year, but has been extended to December 2015. It is being undertaken in four components – breed improvement and dissemination; technology transfer and capacity building; small ruminant production; and marketing and processing.

To date, there have been a number of achievements including: the procurement of 58 animals: 50 ewes, five rams and three bucks; completion of the refurbishment of lecture and student quarters and farm office; training for 15 trainers; expansion of the Forage Research and Production Programme; procurement of tractor, forage harvester and brush cutter; and completion of repairs to the animals' housing.

The Diversification of the Caribbean Livestock through the Production of Small Ruminants project is being funded jointly by the Government (\$20 million) and the Caribbean Development Bank's Common Fund for Commodities, under a grant of \$10.628 million. It is being implemented by the Ministry of Agriculture and Fisheries.

## **Germplasm**

**Toledo farmers get equipment for seed production project** by Patrick E. Jones.  
Patrickjonesbelize.com, 28 March 2014

<http://www.patrickjonesbelize.com/2014/03/28/toledo-farmers-equipment-seed-production-project/>

### **Full Article**

A bold new community initiative was officially launched on Thursday in Silver Creek village in the Toledo district.

The Nim La Ha Chutamil Cooperative Society Limited was officially presented and a seed production facility for the new community group received much needed start-up equipment.

It's a community initiative where people from a small community have come together to help themselves and by extension their neighbors.

The Seeds for Development" project is intended to provide farmers from Silver Creek and surrounding communities to be able to produce quality grains at a minimal cost.

Pablo Choco who is the chairman of the Cooperative says the group comprises 5 men and 5 women who and they are excited about the new venture.

Guest speaker at the official handing over of the equipment to the Nim La Ha Chutamil Cooperative Society Limited for use in its Seeds for Development project was the Chief Agricultural Officer Roberto Harrison.

Technical assistance for the Seeds for Development project was provided by the Caribbean Agricultural Research and Development Institute.

At the official handing over of the equipment, the country representative for CARDI Dr. Anil Sinha told the farmers encouraged the farmers to make good use of the equipment and the training that they received during the initial stages of the project.

The Seeds for Development project began in June, 2012 when the farmers planted their first crop in Silver Creek village.

Formal approval of the Seeds for Development project came in 2013 leading up to the handing over on Thursday, March 28, 2014.

Presently the facility which is about a mile off the Southern Highway in Silver Creek village is able to process corn and beans; but there are plans to expand it to include rice processing.

Anyone interested in utilize the grain thrashing, drying and storage facility which is owned and operated by the Nim La Ha Chutamil Cooperative Society can contact the Chairman Pablo Choco at telephone number 630-3311 or the vice Chairman Alberto Choco at 605-9309.

**Video on You Tube:** The Nim Li Ha Chutamil Cooperative Society received seed production equipment, published on Mar 28, 2014 <http://www.youtube.com/watch?v=35QuYqs4W9Q>

## Renewable energy

**Renewable energy technology access for farmers important.** Barbados Advocate, 6 April, 2014  
<http://www.barbadosadvocate.com/newsitem.asp?more=local&NewsID=35719>

### Full Article

In order to keep help persons interested in agriculture, especially those living in the rural areas to adopt a more environmentally friendly approach, the Caribbean Policy Development Centre is developing a project whereby these persons can gain access to renewable energy for their farms.

This is according to David Bynoe, the National Coordinator for the Global Environment Facility (GEF) Small Grants Programme (SGP), who spoke with the Barbados Advocate recently at their Grantee Project Inception Workshop at the UN House.

“We have several projects within the climate change mitigation focal area. There is one being implemented by the Caribbean Policy Development Centre where they are looking at ensuring that rural women especially within the agricultural sector have all of the renewable energy technology access that is possible and therefore we are going to set up a demonstration farm where they can see how to use solar energy for agricultural production, wind energy and other forms of renewable energy on the farms. In addition, we are going to green those businesses, do an environmental audit and ensure that those businesses are operating as sustainably as possible.”

He said that there is another similar project by Caribsave who would be working on greening those businesses located along the coast of this island.

“There is a partnership that is being forged with Caribsave because they have a very similar project which is looking at greening micro, small and medium enterprises and these enterprises are mainly located along the coast so you are looking at enterprises within the agricultural sector, within the tourism sector, some within the manufacturing sector that may be located along the coast and we would do an audit again on those, we would have some persons come in and access them to make sure that we can green those businesses.”

Bynoe stated that one of the original things about this project is that they would also be looking at new aspects of green financing.

“But what is innovative about this project is that we are creating a new form of micro finance, green finance that they can access. So it is not only about saying, ‘well look this is how you can green your business,’ but it is about providing opportunities for finance so that they can then implement these recommendations in their businesses.” (PJT)

## Climate Change

**Agriculture's greenhouse gas emissions on the rise.** FAO, 11 April, 2014

<http://www.fao.org/news/story/en/item/216137/icode/>

### Full Article

Detailed assessments of both emissions data and mitigation options needed to design adequate responses

11 April 2014, Rome - New FAO estimates of greenhouse gas data show that emissions from agriculture, forestry and fisheries have nearly doubled over the past fifty years and could increase an additional 30 percent by 2050, without greater efforts to reduce them.

This is the first time that FAO has released its own global estimates of greenhouse gas (GHG) emissions from agriculture, forestry and other land use (AFOLU), contributing to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Agricultural emissions from crop and livestock production grew from 4.7 billion tonnes of carbon dioxide equivalents\* (CO<sub>2</sub> eq) in 2001 to over 5.3 billion tonnes in 2011, a 14 percent increase. The increase occurred mainly in developing countries, due to an expansion of total agricultural outputs.

Meanwhile, net GHG emissions due to land use change and deforestation registered a nearly 10 percent decrease over the 2001-2010 period, averaging some 3 billion tonnes CO<sub>2</sub> eq/yr over the decade. This was the result of reduced levels of deforestation and increases in the amount of atmospheric carbon being sequestered in many countries.

Averaged over the 2001-2010 period, agriculture, forestry and other land uses (AFOLU) emissions break down as follows:

- 5 billion tonnes CO<sub>2</sub> eq/yr from crop and livestock production
- 4 billion tonnes CO<sub>2</sub> eq/yr due to net forest conversion to other lands (a proxy for deforestation)
- 1 billion tonnes CO<sub>2</sub> eq/yr from degraded peatlands
- 0.2 billion tonnes CO<sub>2</sub> eq/yr by biomass fires

In addition to these emissions, some two billion tonnes CO<sub>2</sub> eq/yr were removed from the atmosphere during the same time frame as a result of carbon sequestration in forest sinks.

FAO's data based on country reports show that while those emissions continue to increase, they are not growing as fast as emissions from fossil fuel use in other sectors, so the share of AFOLU out of total anthropogenic emissions is actually decreasing over time.

#### *Sources of agricultural emissions*

The largest source of GHG emissions within agriculture is enteric fermentation - when methane is produced by livestock during digestion and released via belches - this accounted in 2011 for 39 percent of the sector's total GHG outputs. Emissions from enteric fermentation increased 11 percent between 2001 and 2011.

Emissions generated during the application of synthetic fertilizers accounted for 13 percent of agricultural emissions (725 Mt CO<sub>2</sub> eq.) in 2011, and are the fastest growing emissions source in agriculture, having increased some 37 percent since 2001.

Greenhouse gases resulting from biological processes in rice paddies that generate methane make up 10 percent of total agricultural emissions, while the burning of savannahs accounts for 5 percent.

In 2011, 44 percent of agriculture-related GHG outputs occurred in Asia, followed by the Americas (25%), Africa (15%), Europe (12%), and Oceania (4%), according to FAO's data. This regional distribution was fairly constant over the last decade. In 1990 however, Asia's contribution to the global total (38%) was smaller than at present, while Europe's was much larger (21%).

#### *Figures for energy use*

The new FAO data also provide a detailed view of emissions from energy use in the agriculture sector generated from traditional fuel sources, including electricity and fossil fuels burned to power agricultural machinery, irrigation pumps and fishing vessels.

These emissions exceeded 785 million tonnes of CO<sub>2</sub> eq. in 2010, having increased by 75 percent since 1990.

#### *Better data means better responses*

Designing responses will require detailed assessments of both emission data and mitigation options. For instance, FAO is already generating disaggregated assessments along supply chains and analyzing the effectiveness of comprehensive mitigation interventions in the livestock sector.

"FAO's new data represent the most comprehensive source of information on agriculture's contribution to global warming made to date," said Francesco Tubiello of the Organization's Climate, Energy and Tenure Division. "Up to now, information gaps have made it extremely difficult for scientists and policymakers to make strategic decisions regarding how to respond to climate change and has hampered efforts to mitigate agriculture's emissions."

"Data on emissions for AFOLU activities support member countries in better identifying their mitigation options and enable their farmers to take faster and more targeted climate-smart responses. This in turn improves their overall resilience and their food security. It also allows the countries to tap into international climate funding and accomplish their rural development goals. We also see much interest in capacity development on these topics at country level and respond to these needs through regional and country-level activities around the globe," he added.

#### *Contribution to IPCC reporting and FAO activities*

Launched in 2012, the FAOSTAT emissions database has been for the first time a key source of GHG emissions data analysis of agriculture, forestry and other land use activities for the fifth IPCC Assessment Report, which is currently undergoing finalization. Data updates and enhancements like those released today will be made annually.

The FAOSTAT emissions database was developed with financial support from the governments of Germany and Norway.

**\$64.9 Million to improve resilience of agricultural sector** by Andrea Braham, Jamaica Information Service, 8 April, 2014

<http://jis.gov.jm/64-9-million-improve-resilience-agricultural-sector/>

### **Full Article**

Government has allocated \$64.9 million towards enhancing the resilience of the country's agricultural sector and coastal areas.

This is set out in the 2014/15 Estimates of Expenditure, currently before the House of Representatives.

The project, which is being financed through the Adaptation Fund and the Government, is being implemented by the Ministry of Agriculture and Fisheries. Its goal is to protect livelihoods and food security in vulnerable communities and increase the overall climate resilience of the agricultural sector.

It is anticipated that for this fiscal year, the project will implement 20 gravity drip irrigation systems; install 20 rainwater harvesting systems; establish two demonstration plots applying effective land husbandry and soil conservation techniques; conduct farmer training in water and land management practices; and conduct climate smart farmer field schools.

The project also expects to process and approve 50 production and productivity grants.

In effect since October 2012, the project has so far conducted a baseline survey and established baseline indicators; procured 30 small scale gravity drip irrigation systems; established one rain water harvesting system; hosted sensitization sessions in targeted communities; as well as engaged a project manager and administrative assistant.

The project is scheduled to end in March 2016.

**Climate Centre being demonstrated in Barbados** by Julia Rawlins-Bentham. Barbados Government Information Service, 1st April, 2014

[http://gisbarbados.gov.bb/index.php?categoryid=8&p2\\_articleid=12139](http://gisbarbados.gov.bb/index.php?categoryid=8&p2_articleid=12139)

### **Full Article**

Barbados is now one step closer to fully establishing a Regional Climate Centre (RCC).

This will come about because the RCC is now in demonstration mode, and is expected to gain significant ground following the recent launch of the Programme for Building Regional Capacity in the Caribbean.

Permanent Secretary in the Ministry of Agriculture, Food, Fisheries and Water Resources Management, Esworth Reid, explained that such a programme in Barbados would address current deficiencies in the lack of accurate and consistent climate data and information in the region as being one of the top constraints.

He made these comments recently during a ceremony at the Caribbean Institute for Meteorology and Hydrology (CIMH) to launch the programme. The United States Government is providing over US\$5 million in funding over the next three years to establish the Centre for the Caribbean at the CIMH.

“The programme is timely and its objectives will build critical capacities at regional and national levels to access, analyse and use climate data to better inform decision-making in climate sensitive sectors,” he said, adding these sectors would include the areas of agriculture, water resources and tourism.

Noting that Small Island Developing States were susceptible to climate change, Mr. Reid stated that the outputs and outcomes from the programme would contribute to their sustainable development.

That, he said, would be done through supporting the region’s initiatives to adapt climate change and increasing climate variability and disaster risk reduction. “I envisage a Caribbean resilient to climate risks and hydro-meteorological hazards, an inheritance we can be proud to pass onto future generations,” he noted.

The Permanent Secretary, who is also the Chairman of the CIMH Board of Governors, warned that the impacts of climate change on economies like Barbados could be more severe than the impact of any global economic recession.

“At least our Governments can manipulate current tax structures and public expenditure in an attempt to dampen the effect of a global economic recession on the local economy, but such policies would not work when the economy is impacted by a phenomena such as climate change...,” he stated.

The impact of climate change on economies like Barbados may be more severe than the impact of any global economic recession.

Principal of the CIMH, Dr. David Farrell, said he hoped that the Centre, now in demonstration mode, would be the first to be established in this part of the region. He explained that the Centre was concerned about building the capabilities of people to do things for their own region.

“We need to be able to tell people how to plan, and this investment will ensure that we have some level of sustainability,” he pointed out.

Among the benefits of the programme are seasonal forecasting capabilities; access to the use of remote sensing data for assessing climatological risk; enhancing the statistical capabilities of the CIMH; and communications and marketing.

US Ambassador, Larry Palmer, said the Centre would also help the region to better understand how the climate was changing and how its people could best respond strategically to increase the resilience of economies, ecosystems and communities.

He added that it would also strengthen the capacity of the CIMH and national institutions across the region to monitor the changing climate and to convert data into products that would better inform decision-making in climate-sensitive sectors.

## **Soil and Water management**

**Irrigation Feasibility Assessment Project to Get \$3.1 Million** by Latonya Linton, Jamaica Information Service, 9 April, 2014

<http://jis.gov.jm/irrigation-feasibility-assessment-project-get-3-1-million/>

### **Full Article**

The Government has allocated \$3.1 million in the 2014/2015 Estimates of Expenditure for the Wind Powered Irrigation Feasibility Assessment Project.

The Estimates of Expenditure are to be considered by the Standing Finance Committee of Parliament from April 8 to 10.

The objectives of the project are to conduct a wind assessment in the Pedro Plains area of St. Elizabeth by erecting a wind data logger, and observing the wind pattern for 12 months; and determining the feasibility of using wind-generated electricity for pumping irrigation water.

A Cooperation Agreement has been established between the Organisation of American States (OAS) and the Ministry of Science, Technology, Energy and Mining. Also, the OAS has committed to providing funding for the project.

Other achievements include the establishment of an Agreement and Memorandum of Understanding between the National Irrigation Commission and the following partners: Digicel Jamaica Limited, the University of the West Indies, and Wigton Wind Farm Limited.

Activities, so far, include: installation of wind assessment equipment on Digicel cell towers; and monitoring of wind assessment equipment and collection of data by the University of the West Indies.

Anticipated targets for 2014-15 include the completion of the wind assessment feasibility study of Pedro Plains, using the wind data logger.

## Agriculture Development

**‘Private sector must do more against praedial larceny’** by Ruth Moisa Stoute, 10 April, 2014  
<http://www.barbadosadvocate.com/newsitem.asp?more=local&NewsID=35795>

### Full Article

The Inter-American Institute for Corporation on Agriculture (IICA) Representative to Barbados, Jean Lowry is of the firm belief that the private sector must play a more forceful role in tackling issues of praedial larceny.

Speaking recently to the Barbados Advocate, Lowry expressed her pleasure at Government's announcement to establish a Praedial Larceny Task Force committee, which would involve key government agencies as well as other stakeholders.

Permanent Secretary in the Ministry of Agriculture, Food, Fisheries and Water Resource Management, Elsworth Reid, had recently described praedial larceny as “one of the most troubling” factors leading to a perceived demise in the agricultural industry and vowed that a committee would be set up within the ministry to “advise the government” even as it sought to feverishly tackle the problem.

However, Lowry though welcoming the move, said that the legislation which government was seeking to put in place should not be seen as the “be all and the end all” of a national response to the longstanding situation.

“I honestly think that government is doing what it can [and that] it also can take more steps ... but I am not very satisfied either with how the private sector is actually policing their own communities. Where is the community watchman, where are the people keeping an eye on each others’ farms and livestock?” Lowry asked.

The IICA representative said that she hoped a large portion of the task force committee was going to come from the private sector, “and it better be those who are in a position to be able to influence other business entities [even neighbours and friends] to be able to support what the government is doing in this area... If you sit around waiting and doing nothing, nothing is going to happen,” she said.

Lowry specifically pointed to areas fully within the control of the individual farmer, which they could address without even having the involvement of government or any agency: for instance, poor lighting or junk material on the property which provides hiding places for thieves; improper fencing; little or no security systems in place.

**Treat farming as a business.** Barbados Advocate, 11 April, 2014

<http://www.barbadosadvocate.com/newsitem.asp?more=local&NewsID=35813>

### **Full Article**

More members of the farming community need to see themselves as business persons and consequently operate as such. As a result of a persisting gap between farmers and mainstream businesses, farmers can find it more difficult to access the financial and technical support being offered by several national and regional business support organisations.

This was the expressed view of Inter-American Institute for Corporation in Agriculture (IICA) Representative to Barbados, Ms. Jean Lowry.

In a brief interview with the Barbados Advocate following a recently held accountability seminar involving IICA's team and representatives from partnering associations, Lowry acknowledged that business support organisations needed to do more in terms of community outreach to inform businesses of what forms of assistance were available to them. She however called on the private sector to “step up to the plate” themselves and prove that they were indeed “ready to take advantage” of the support being offered.

Lowry said that that required small businesses especially to be ready to produce the necessary paper work and to “follow the rules”. “That is how we operate ... but you find that the private sector wants funding now, they don't want to wait the normal process of time for something like six months or more,” Lowry told this paper.

Stating that there were some really good examples of agri-businesses and agri-entrepreneurs on the island, she still believed that many still did not make the link between farming and business.

“Some do not see themselves as members of the private sector... they see themselves as farmers and hold the view that [the agencies] are suppose to come to [them]. However, if they operated like they were running a business [with deadlines, goals and targets to be met, and so on] we would see a more proactive approach from them... Those who avail themselves... to seek out what agencies have to offer, they are the ones that actually position themselves very well to take advantage of our services”. (RS)

**\$110 Million to Boost Exports to the EU** by Latonya Linton. Jamaica Information Service, 9 April, 2014

<http://jis.gov.jm/110-million-boost-exports-eu/>

### **Full Article**

A total of \$110 million has been allocated in the 2014/15 Estimates of Expenditure for the European Development Fund (EDF) Economic Partnership Agreement (EPA) Capacity Building Project.

The project aims to contribute to facilitating increased and more diversified exports of agricultural and agro-processed products to the European Union (EU) market.

As of February 2014, equipment was procured for laboratories at the Bureau of Standards Jamaica, Veterinary Services Division, Bodles Research Station and the Pesticides Research Laboratory at the University of the West Indies.

Five participants also attended international conferences; four training courses for food safety were conducted; and one food laboratory was upgraded.

For the 2014/15 fiscal year, the project hopes to procure equipment for one laboratory; attain accreditation for four laboratories; train four public officials in food safety and other related standards; participate in six missions to international fora; and organize five events to promote private sector participating in relation to trade policy and related issues.

The project is funded by the European Union and the Government of Jamaica and is expected to be completed by May 2015.

**Growing greener cities in Latin America and the Caribbean.** FAO, 8 April, 2014

<http://www.fao.org/news/story/en/item/223292/icode/>

### **Full Article**

New FAO report highlights urban and peri-urban agriculture in 10 major cities of the region

8 April 2014, Santiago de Chile - A new FAO report finds that urban and peri-urban agriculture (UPA) is widespread in Latin America and the Caribbean, but realizing its full potential requires increased support from national, state and local governments.

“Growing greener cities in Latin America and the Caribbean” looks at the progress that has been made toward realizing 'greener cities' in which urban and peri-urban agriculture is recognized by public policy and included in urban development strategies and land-use planning. It is based on the results of a survey in 23 countries and data on 110 cities and municipalities.

The new report released at the World Urban Forum in Medellín, Colombia, includes profiles of agriculture practiced in and around cities such as **Havana**, Mexico City, **Antigua and Barbuda**, Tegucigalpa, Managua, Quito, Lima, El Alto (Bolivia), Belo Horizonte (Brazil) and Rosario (Argentina).

FAO's inquiry found that UPA is practised by 90 000 residents of Havana, and by 20 percent of urban households in Guatemala and Saint Lucia. In Bolivia's main cities and municipalities, 50 000 families are also food producers. In Bogotá, 8 500 households produce food for home consumption.

The main benefit of UPA is improved access to food by low-income families. However, in 16 of the 23 countries surveyed, people practising UPA earned some income from the activity.

A strong trend in many UPA programmes in Latin America and the Caribbean is toward agricultural technologies and practices that produce more, and better quality, food while optimizing the use of natural resources and reducing reliance on agrochemicals.

In Rosario, Argentina, gardeners cultivate high-yielding beds of compost substrate. In Managua, they enrich the soil with fertilizer made by anaerobically fermenting household wastes. In El Alto, a project installed, in small, locally made greenhouses, hydroponic gardens that produce one tonne of vegetables per year.

Another trend in Latin American cities is the spread of farmers' markets that sell locally-grown organic food. Many urban farmers have entered the value chain as intermediate or final processors of fruit, vegetables, meat, canned goods, dairy foods, snacks and natural cosmetics.

Many urban and peri-urban farmers have been tapped as suppliers of institutional feeding programmes. In Havana, UPA provided in 2013 some 6 700 tonnes of food to almost 300 000 people in schools, public health centres and hospitals.

#### *Government support needed*

FAO says that growing greener cities with agriculture needs the support of government. However, only 12 of the 23 countries surveyed have national policies that explicitly promote UPA. FAO's survey also found that UPA is often excluded in city land use planning and management in Latin America and the Caribbean.

The good news is that UPA has been mainstreamed at a fairly high level within national institutions. In Bolivia, for example, the Ministry of Productive Development and Plural Economy will launch, with FAO's assistance, a national UPA programme in 2014.

In a growing number of cities, urban and peri-urban agriculture is recognized in urban development planning. In Rosario, the municipality is building a "green circuit" of farmland passing through and around the city. Food production is also recognized as a legitimate non-residential land use, on a par with commerce, services and industry, in Belo Horizonte, Brazil.

FAO stresses that meeting urban food needs requires not only UPA but performing food systems that supply a variety of food products to - and distribute them within - expanding urban areas, an understanding of their structure, how their activities impact food safety and quality and natural resources, and how they might exclude vulnerable sectors of the urban population.

Addressing short-comings in complex food system requires strong political commitment, regional development plans and effective public-private partnerships.

**Barbados and Argentina discuss agriculture** by Julie Carrington. Barbados Government Information Service, 7 April, 2014

[http://gisbarbados.gov.bb/index.php?categoryid=9&p2\\_articleid=12163](http://gisbarbados.gov.bb/index.php?categoryid=9&p2_articleid=12163)

### **Full Article**

Matters pertaining to cooperation in agriculture and its byproduct industries were among the areas discussed, when Argentina's Ambassador to Barbados, Diego Limeres, paid a courtesy call recently on Minister of Agriculture, Food, Fisheries and Water Resource Management, Dr. David Estwick.

During the meeting at the Ministry, last Tuesday, the Ambassador said the reopening of the Embassy four months ago would allow for closer talks on areas of cooperation to strengthen the existing bilateral relationship between the two countries.

He acknowledged that there were similarities between the Ministries of Agriculture in both countries. The Ambassador gave an undertaking to "formulate an agreement between the two ministries and to promote a visit of a technical delegation to have some exchanges".

"Any suggestions that you [Dr. Estwick] might have to strengthen a particular area will be welcomed and I will transmit this information to my authorities," Ambassador Limeres underlined.

In turn, the Agriculture Minister said he had a particular interest in the trade of agriculture products and was currently examining ways to apply modern technology in agriculture to boost agro processing.

"We are still functioning very heavily off the primary system of operation where a lot of our products are still in the raw form. But, we need to move towards the business side of agriculture which is food and agriculture development [or] agro processing. Any assistance on that side where we can have our personnel trained and be exposed could be of importance to us," Dr. Estwick added.

The two officials also discussed educational cooperation through the provision of scholarships and student exchanges, fisheries development and sugar and its by-product industries. Argentina and Barbados established diplomatic ties on August 16, 1968.

**\$313.7 Million Earmarked to Continue Agricultural Competitiveness Programme** by Andrea Braham, Jamaica Information Service, 6 April, 2014

<http://jis.gov.jm/313-7-million-earmarked-continue-agricultural-competitiveness-programme/>

**Full Article**

Just over \$300 million is budgeted to be spent this year on the Ministry of Agriculture and Fisheries' Agricultural Competitiveness Programme. The project aims to increase competitiveness in the agriculture sector by facilitating small and medium farmers' access to markets; ensuring the production of safe and high quality food and products; and stimulating public-private investment in agribusiness value chain development.

Formerly known as the Rural Competitiveness Programme, the project is being funded by the Inter-American Development Bank (IDB) in the amount of \$312 million, with the Government of Jamaica providing a further \$1.7 million. This sum is contained in the 2014/15 Estimates of Expenditure, now before the House of Representatives.

The project has three components: implementation of a system to support market development; implementation of quality management systems; and promotion of private investments in competitive and sustainable enterprises.

Among the programme's targets for the 2014/15 financial year are: procurement of laboratory equipment for the Veterinary Services Division (VSD) and food safety laboratories; refurbishing of the Research and Development Plant Health laboratory at Bodles, St. Catherine; construction of a canine holding area at Hope Gardens, St. Andrew, and a contraband room in Montego Bay, St. James; refurbishment of quarantine facilities, and two parish offices; and procurement of computers and software for an animal health laboratory network to be established.

The project will also engage consultants to establish a food safety laboratory network; review the food borne illness surveillance and emergency response system; and facilitate preparation of a proposal for a modernized food inspection and registration system.

Other targets for the year include: installation of irrigation infrastructure at the Spring Plain/Ebony Park Agro Park; establishment of packaging facilities at New Forrest/Duff House, and Yallahs; and construction of drainage infrastructure at the Spring Plain/Ebony Park and New Forrest/Duff House Agro Parks.

The project is also expected to facilitate further research on Jamaican exporting practices and constraints for non-traditional products in the main export markets of the European Union (EU), Canada, and the United States of America; training for 50 members from 25 producer organizations in group dynamics, and Farmer Field Schools (FFS) training in product and post-harvest technologies.

In effect since November 2010, the project has, to date, recorded several achievements. These include: drafting of a Cabinet-approved Food Safety Policy, for which a National Agricultural Health and Food Safety Committee is currently developing an implementation plan; procurement of 30 laptop computers for staff of the Rural Agricultural Development Authority (RADA); procurement of post-harvest kits for 13 marketing/extension officers; training of Ministry of Health personnel in meat and poultry inspection overseas, as well as in Environmental Performance Index procedures; acquisition of computers for the Quarantine Services and Veterinary Services Divisions; as well as facilitating 10 stakeholder workshops to review an Animal Health Policy proposal.

**Government of Jamaica Ministry of Agriculture & Fisheries Operational Plan 2014 – 2015, dated March 18, 2014**

<http://www.moa.gov.jm/AboutUs/MoAF-2014-2015-Operational-Plan.pdf>

## **Upcoming Events**

### **2014 International Year of Family Farming (IYFF). FAO**

<http://www.fao.org/family-farming-2014/home/en/>

#### **Description**

The 2014 **International Year of Family Farming (IYFF)** aims to raise the profile of family farming and smallholder farming by focusing world attention on its significant role in eradicating hunger and poverty, providing food security and nutrition, improving livelihoods, managing natural resources, protecting the environment, and achieving sustainable development, in particular in rural areas.

The goal of the 2014 IYFF is to reposition family farming at the centre of agricultural, environmental and social policies in the national agendas by identifying gaps and opportunities to promote a shift towards a more equal and balanced development. The 2014 IYFF will promote broad discussion and cooperation at the national, regional and global levels to increase awareness and understanding of the challenges faced by smallholders and help identify efficient ways to support family farmers

May 2014

#### **Building Resilience for Food and Nutrition Security. IFPRI 2020 Conference**

**Date:** 15-17 May 2014

**Location:** Addis Ababa, Ethiopia

**Website:** <http://www.2020resilience.ifpri.info/>

#### **7th Caribbean Beekeeping Congress and the 2nd Annual Caribbean Bee College**

**Date:** 26-30 May 2014

**Location:** St. Croix, United States Virgin Islands at the Albert A. Sheen Campus, University of the Virgin Islands, Kingshill,

**Contact:** [CBC.CBCVI@gmail.com](mailto:CBC.CBCVI@gmail.com)

June 2014

#### **The International Seed Testing Association (ISTA) Annual Meeting**

**Date:** 16-19 June 2014

**Location:** Edinburgh, UK

**Website:** <http://seedtest.org/en/annual-meeting-2014-content---1--1409.html>

July 2014

**50th Caribbean Food Crops society (CFCS) Annual Meeting, United States Virgin Islands.**

**Date:** 5-12 July 2014

**Website:** <http://cfcs.eea.uprm.edu/>

**XII World Congress of Computers in Agriculture and Natural Resources**

**Date:** 27- 30 July, 2014

**Location:** San Pedro, San José, Costa Rica

**Description**

This congress provides a forum for agriculture related professionals to exchange information on applications and developments in the use of Information Technologies. It covers a wide array of topics. These include new applications of well established and understood technologies to innovative and entrepreneurial applications of emerging technologies, in addition to issues related to policy and knowledge dissemination. Contributions from various countries will allow a broadened perspective for all attending. This congress is sponsored by International Network for Information Technology in Agriculture and the University of Costa Rica (UCR).

**Abstracts submission deadline:** 15 February, 2014

**Website:** <http://wcca2014.ucr.ac.cr/>

**Conference on Ecological and Ecosystem Restoration 2014**

CEER is a Collaborative Effort of the leaders of the National Conference on Ecosystem Restoration (NCER) and the Society for Ecological Restoration (SER).

**Date:** 28 July - 1 August, 2014

**Location:** New Orleans, Louisiana, USA

**Website:** <http://www.conference.ifas.ufl.edu/CEER2014/>

August 2014

**XI International Congress on Management of Amazonian and Latin American Wildlife**

St. Augustine, Trinidad and Tobago,

**Date:** 17 - 22 August 2014

**Location:** St. Augustine, Trinidad and Tobago,

Theme: “Alternative Sustainable Conservation & Utilization Methods for Neo-tropical Animals”

**Website:** <http://xicimfauna.org/>