



IMPROVING LIVES THROUGH
AGRICULTURAL RESEARCH

HQ004/14

R & D *in* AGRICULTURE



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A Bulletin on Information Resources



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Improving Lives Through Agricultural Research

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R&D in Agriculture: a bulletin on information resources

AIMS AND SCOPE

The **R&D in Agriculture: a bulletin on information resources** aims to guide CARDI staff and other agricultural stakeholders in the Caribbean Community (CARICOM) and abroad to articles, journals, books, audio-visual materials, institutions and events on the following:

Commodities

- Roots & tubers (cassava, sweet potatoes)
- Cereals & grain legumes
- Hot peppers
- Fruits & vegetables
- Small ruminants

Thematic Areas

- Protected agriculture
- Emerging issues (agro-energy, herbals, organics)
- Soil & water management
- Risk management (climate change, invasive species)
- Germplasm
- Biotechnology
- Feeds and feeding systems

These are the priority commodities and thematic areas in the Medium-Term Plan (2011/2013) of the Caribbean Agricultural Research and Development Institute (CARDI). They were identified after consultation with our CARICOM member states and contribute to the implementation of the Jagdeo Initiative and the Regional Transformation Programme (RTP) for Agriculture.

Short bibliographic references to publications, brief descriptions of the research and services of relevant institutions, as well as lists of events are presented in this publication. Where possible a web address (URL) is provided so that readers may visit the webpage / website and access the full abstract, summary, document, or details for the acquisition of the resource.

Issues of this publication are available on our website, www.cardi.org, under the Publications section.

Frequency: 3 times a year - April, August, December

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AGRICULTURE: GENERAL

Proceedings of the Caribbean Food Crops Society 49th Annual Meeting, June 30 – July 6, 2013, Hyatt Regency Hotel, Port of Spain, Trinidad and Tobago. “Agribusiness Essential for Food Security: Empowering Youth and Enhancing Quality Products”

Wanda I. Lugo, Héctor L. Santiago, Rohanie Maharaj, and Wilfredo Colón (eds.)

[2014]. San Juan, Puerto Rico: Caribbean Food Crops Society

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Contents

Agribusiness

Staples, vegetables, fruits, pulses

Extension

Youth empowerment

Strategic commodities

Aquaculture and livestock

Irrigation, fertilizer, weeds

Agro-ecology/soils

Invasive species

COMMODITIES: ROOTS & TUBERS

CASSAVA:

New techniques for increased yields in cassava production

M. Mycoo

2013. Proceedings of the Caribbean Food Crops Society 49:119

Abstract:

Average yields in cassava (*Manihot esculenta* Crantz) have been recorded by the FAO and other International agencies as 10-12,000 lbs per acre with 4' x 4' spacing and 3500-4000 plants per acre. Utilising the combined use of plant growth regulators, key trace elements and NPK fertilizers applied targeting specific physiological stages, yields over 90,000lbs/acre and as high as 120,000lbs/acre have been obtained in commercial plantings of the same density. The crops were grown over a four year period on Moruga Sandy Clay Shale, Moruga Clay Alluvium soils with imperfect drainage and a free draining Todd's Rd Arena Sands under non-irrigated conditions and yield patterns obtained were similar. Further work evaluating the technology on different cassava varieties, density, soil types and irrigated conditions is required.

Keywords: New Techniques, Cassava, Production, Yields

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Phenotypic approaches to drought in cassava: review

Okogbenin, Emmanuel; Setter, Tim L.; Ferguson, Morag; Mutegi, Rose; Ceballos, Hernán; Olasanmi, Bunmi; Fregene, Martin

2013. Frontiers in Physiology Volume 4, Article 93:1-15

<http://journal.frontiersin.org/Journal/10.3389/fphys.2013.00093/full>

Prediction of carotenoids, cyanide and dry matter contents in fresh cassava root using NIRS and Hunter color techniques

T. Sánchez, H. Ceballos, D. Dufour, D. Ortiz, N. Morante, F. Calle, T. Zum Felde, M. Domínguez, F. Davrieux

2014. Food Chemistry 151:444–451

Abstract

Efforts are currently underway to improve carotenoids content in cassava roots through conventional breeding as a strategy to reduce vitamin A deficiency. However, only few samples can be quantified each day for total carotenoids (TCC) and β -carotene (TBC) contents, limiting the gains from breeding. A database with >3000 samples was used to evaluate the potential of NIRS and chromameter devices to predict root quality traits. Maximum TTC and TBC were up to 25.5 and 16.6 $\mu\text{g/g}$ (fresh weight basis), respectively. NIRS predictions were highly satisfactory for dry matter content (DMC, R^2 : 0.96), TCC (R^2 : 0.92) and TBC (R^2 : 0.93). NIRS could also distinguish roots with high or low cyanogenic potential (R^2 : 0.86). Hunter color parameters could also be used for predictions, but with lower accuracy than NIRS. NIRS or chromameter improve selection protocols, allowing faster gains from breeding. Results also demonstrate that TBC and DMC can be improved simultaneously (required for the adoption of biofortified cassava).

Keywords: Biofortification; Prediction; Nutritional quality; Colour intensity; Pigments

<http://www.sciencedirect.com/science/article/pii/S0308814613017184>

Sustainable soil and crop management of cassava in Asia

Reinhardt Howeler

2014. Cali, Colombia: Centro Internacional de Agricultura Tropical (CIAT). 280 p. (CIAT Publication No. 389)

http://ciat-library.ciat.cgiar.org/Articulos_Ciat/Sustainable_soil_crop_management_cassava_asia_2014.pdf

Contents

Chapter 1. What is cassava, where is it grown and what is it used for?

Chapter 2. How is cassava grown?

Chapter 3. What are the major constraints to high yields?

Chapter 4. Are there better varieties we can use?

Chapter 5. Does cassava production degrade or improve the soil?

Chapter 6. How to diagnose nutritional problems

Chapter 7. Can chemical fertilizer and manure maintain high yield and long-term productivity of the soil?

Chapter 8. How to apply NPK fertilizers: what kind, how much, when and where

Chapter 9. Secondary and micronutrient requirements and the use of soil amendments

Chapter 10. Are there biological ways to improve the soil and increase cassava yield?

Chapter 11. Is soil erosion a problem?

Chapter 12. Other agronomic practices

Chapter 13. What to do to prevent serious pest and disease problems

Chapter 14. Farmers decide!

Appendix Conducting field experiments with cassava

SWEET POTATO:

Comparative yield of four sweet potato (*Ipomoea batatas*) cultivars planted in single and double rows

J. Broomes

2013. Proceedings of the Caribbean Food Crops Society 49:99-107

Abstract

A study was conducted in split-plot design to determine the effect of single- and double-row plantings on the yield of four sweet potato cultivars (local names: 'Manager's Pudding', 'Caroline Lee', 'CBS 49' and 'CBS 32') commonly planted on the estates of the Barbados Agricultural Management Company Ltd. Cuttings were established on raised beds 5.5 ft apart. Single-rows consisted of cuttings placed on the centre of the beds with a spacing of 1 ft intra-row. For the double-rows, cuttings were established on both sides of the bed with 1.5 ft between rows and 1 ft intra-row. Shortly after establishment, the sweet potato was sprayed with Fusilade® (Fluazifop-p-butyl) using the recommended rate for the control of grass weeds. Mono-ammonium Phosphate was manually placed 6 inches away from all cuttings, after they were well established, at a rate of 100 lb per acre. Yield data showed that double-row planting of 'Caroline Lee', 'CBS 49', 'Manager's Pudding' and 'CBS 32' resulted in 21.3%, 31.4%, 16.7% and 16.8% significant decrease in average weight/ tuber, respectively, compared to single-row plantings. The total weight of tubers/ hole also decreased from single- to double-row planting ('Caroline Lee' - 35.7%, 'CBS 49' - 44.7%, 'Manager's Pudding' - 38.5% and 'CBS 32' - 43.5%) due to increased competition for resources in the smaller inter-row space. Smaller tubers were obtained from double-rows. These are suitable for the average household purchaser while the larger tubers from the single-rows are ideal for processors. Data extrapolation showed that the total yield/ acre increased from single- to double-row planting for each cultivar. As one moves from single- to double-row planting, the total number of holes per acre doubles resulting in the expected increase in total yield. Total yield per acre (kg) increased by 28.7% for 'Caroline Lee'; 10.5% for 'CBS 49'; 23% for 'Manager's Pudding'; and 13.0% for the 'CBS 32' cultivar.

Keywords: sweet potato, *Ipomoea batatas*, single-row, double-row, yield, cultivar

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Genetic diversity and accession identification in sweet potato- phase 1: ISSR optimization and determination of the initial levels of genetic diversity

A. Charles, N. Austin and J. Rouse-Miller

2013. Proceedings of the Caribbean Food Crops Society 49:113

Abstract

Development of molecular markers to analyse cultivated species is of utmost importance for efficient conservation and identification of accessions. In Trinidad, there are over twenty cultivated accessions of sweet potato but nothing is known about the level or structure of genetic diversity among these cultivars or whether duplicate accessions exist. In order to determine this data, a robust protocol capable of generating clear and reproducible molecular markers must be developed. In this pilot study Inter Simple Sequence Repeats (ISSRs) were used to generate DNA markers in fifteen (15) sweet potato accessions. Of the various optimizations attempted, DNA purity, magnesium chloride concentration and annealing temperature were the parameters of most importance in producing quality DNA markers. Of the eight ISSR primers, six were capable of optimization to generate clear and sharp markers. Fifty-three markers were generated with an average of 8.7 markers per primer. Twenty-eight (28) of these markers were polymorphic with an average of 4.7 polymorphic markers per primer. A moderate level of polymorphism (53.8 %) was observed among the cultivars. Jaccard's similarity matrix revealed a high level of genetic similarity among the *I. batatas* accessions with the lowest coefficient (0.050) seen between cultivars '99' and 'bugs bunny' implying that these are the most genetically closely related. Based on this study, it was determined that at least eleven primers should be utilized in order to conduct a comprehensive study to determine accession duplication and genetic characterization of sweet potato cultivars.

Keywords: Genetic Diversity, Accession Identification, Sweet Potato, ISSR.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Identification of QTLs for storage root yield in sweetpotato

Hui Li, Ning Zhao, Xiaoxia Yu, Yanxia Liu, Hong Zhai, Shaozhen He, Qiang Li, Daifu Ma, Qingchang Liu

2014. *Scientia Horticulturae* 170:182–188

Abstract

Sweetpotato breeding is challenging due to its genetic complexity, and marker-assisted breeding tools are needed to facilitate the improvement of this crop. In the present study, we identified quantitative trait loci (QTL) for storage root yield of sweetpotato using a mapping population consisting of 202 individuals derived from a cross between Xushu18 (a high yield cultivar) and Xu781 (a low yield line). Two parental linkage maps based on AFLP and SSR markers were constructed using this mapping population. Interval mapping (IM) was performed first and, subsequently, a multiple QTL model (MQM) was used to refine the position and magnitude of the QTL. A total of nine major QTLs for storage root yield were mapped, explaining 17.7–59.3% of the variation. These 9 QTLs, *YIEF_1*, *YIEF_2*, *YIEF_3*, *YIEF_4*, *YIEM_1*, *YIEM_2*, *YIEM_3*, *YIEM_4* and *YIEM_5*, were co-localized to markers E24M1-17d, E53M30-12d, C27_8s**, E63M3-10d, E50M49-4d, IB_S10_9d, E54M5-4d, E21M8-23d and IB_S10_4d, respectively.

Keywords: Interval mapping; Multiple QTL model; QTL; Storage root yield; Sweetpotato

<http://www.sciencedirect.com/science/article/pii/S0304423814001307>

Procedures for chemical analysis of potato and sweetpotato samples at CIP's Quality and Nutrition Laboratory

Burgos, G.; Muñoa, L.; Sosa, P.; Cayhualla, E; Carpio, R.; zum Felde, T.

2014. Lima, Peru. International Potato Center (CIP), Global Program Genetics and Crop Improvement

<http://nmxms1019hx1xmtstxk3k9sko.wpengine.netdna-cdn.com/wp-content/uploads/2014/07/006161.pdf>

<http://cipotato.org/resources/publications/manual/procedures-for-chemical-analysis-of-potato-and-sweetpotato-samples-at-cips-quality-nutrition-laboratory/>

Procedures for sampling and sample preparation of sweet potato roots and potato tubers for mineral analysis

Porras, E.; Burgos, G.; Sosa, P.; zum Felde, T.

2014. Lima, Peru. International Potato Center (CIP), Global Program Genetics and Crop Improvement.

<http://nmxms1019hx1xmtstxk3k9sko.wpengine.netdna-cdn.com/wp-content/uploads/2014/07/006160.pdf>

<http://cipotato.org/resources/publications/manual/procedures-for-sampling-and-sample-preparation-of-sweetpotato-roots-and-potato-tubers-for-mineral-analysis/>

COMMODITIES: HOT PEPPERS

MORUGA RED:

Descriptors for the hot pepper variety: Moruga Red

H Adams H, N Ramtahal and N Seebaran

2010. St. Augustine, Trinidad and Tobago: Caribbean Agricultural Research and Development Institute

PSC #: TT/001/11

This document is intended to give an abridged version of the International Plant Genetic Resources Institute (IPGRI) “Descriptors for Capsicum 1995”. It is hoped that farmers and seed handlers will readily recognise the improved hot pepper landrace, Moruga Red (*Capsicum chinense* Jacq var Moruga Red), from the images and descriptions herein. The booklet was deliberately made to be user friendly by limiting the number of attributes of plant and berries to 35. The definitions of the attributes were mainly adopted from the IPGRI Descriptors.
<http://www.cardi.org/wp-content/uploads/downloads/2014/07/Descriptors-for-Hot-Pepper-Variety-Moruga-Red.pdf>

WEST INDIES RED:

The effect of organic mulches on the growth and yield of “West Indies Red” hot pepper (*Capsicum* Spp.)

S. Skeete

2013. Proceedings of the Caribbean Food Crops Society 49:453-458

Abstract

Organic mulches are available locally in bulk quantities and at reasonable prices. Such mulches represent an environmentally friendly alternative for weed control and tend to enhance soil conditions. Three organic mulches were applied to plots of West Indies red hot pepper (*Capsicum* spp.). Wood chips, green waste and coconut fibre were spread in a 7.5 cm thick layer on the surface before planting. A treatment without any mulch was used as control. Treatments were replicated in 4 blocks. Growth was assessed, primarily, by measuring plant height weekly. Harvesting was done continually up to six months after planting. The best total yield was obtained from plants mulched with green waste [6.90 Kg/plot] but this was not significantly different from the control. The wood chip mulch significantly reduced the growth and yield (4.25 Kg/plot, F pr=.02) as compared to in the control (6.44 Kg/plot).

Keywords: organic mulches, hot pepper, yield, growth.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Improved growth and yield of “West Indies Red” hot pepper (*Capsicum* spp.) when grown under tropical row covers

S. Skeete

2013. Proceedings of the Caribbean Food Crops Society 49:114-118

Abstract

The benefits of protected agriculture in assuring production under suboptimal climatic conditions, are well recognised. Microclimate control is further seen as a likely approach for small farmers in mitigating the effects of climate change. However, the typical greenhouse can be a prohibitively large investment for a small-scale farmer. Tropical row covers can be a flexible, low-cost approach to protected agriculture in open fields of small farms, especially if modular designs are used. The effect of tropical row covers on the growth and yield of hot pepper (*Capsicum* spp.) was tested using specially built covers. These were made as mini-tunnels from PVC conduit, insect screen and plastic to make them durable and mobile. Each structure was 1.7 m wide x 3.3 m long x 1.3 m high. The upper arch was covered with clear plastic while the lower sides and ends had fine insect mesh. These covers were distributed in the field and each one had an adjoining open plot, occupying the same area, as a control. There were six replicates. For plants growing under the covers, the average number of fruit per plant was 73.6 versus 15.2 in the open (FPr, <.001). Pepper berries grown under the covers were larger on average (12.59 g vs. 7.44 g; FPr< .05). The covers also reduced the incidence of broad mite (*Polyhagotarsonemus latus*) and bacterial spot (*Xanthomonas campestris*), thus facilitating good growth.

Keywords: protected agriculture, tropical row covers, hot pepper, yield, growth

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

GERMPLASM / PLANT BREEDING:

CaDMR1 co-segregates with QTL Pc5.1 for resistance to *Phytophthora capsici* in pepper (*Capsicum annuum*)

William Z. Rehrig, Hamid Ashrafi, Theresa Hill, James Prince, Allen Van Deynze
2014. The Plant Genome: Posted 11 Apr. 2014; doi: 10.3835/plantgenome2014.03.0011

Abstract

A major problem for the pepper (*Capsicum annuum*) industry is the root rot disease caused by *Phytophthora capsici* (*Pc*), to which all commercial varieties suffer yield losses despite good management practices and available landraces with high levels of resistance. A high-density map with 3,887 markers was generated in a set of recombinant inbred lines derived from the highly resistant *Capsicum annuum* accession Criollo de Morelos-334 and Early Jalapeño. These lines have been systematically screened for *Pc* resistance against a set of isolates collected from Mexico, New Mexico, New Jersey, California, Michigan and Tennessee. Quantitative Trait Loci (QTLs) associated with effective resistance across isolates have been identified and validated with SNP markers across an additional segregating population. By leveraging transcriptomic and genomic information, we describe CaDMR1, a homoserine kinase, as a candidate gene responsible for the major QTL on chromosome P5 for resistance to *Pc*. SNP markers for the resistant allele were validated to facilitate gene pyramiding schemes for recurrent selection in pepper.

Keywords: *Capsicum annuum*, *Phytophthora capsici*, pepper, root rot, Quantitative Trait Loci (QTLs), homoserine kinase, marker-assisted selection, disease resistance

<https://www.crops.org/files/publications/tpg/first-look/tpg14-03-0011.pdf>

Development of the hot pepper industry in the English-speaking sub-region of the Caribbean – genetic improvement

H. Adams, C. Roberts, A. Sinha, B. Lauckner, and J. Lawrence
2013. Proceedings of the Caribbean Food Crops Society 49:65-70

Abstract

Hot peppers (*Capsicum chinense* Jacq.) are popular in the Caribbean among growers, consumers, agro-processors. CARDI has been conserving and developing the Regional Capsicum germplasm. The Institute selected the first commercial cultivars such as the West Indies Red and CARDI Green which are being planted in many countries. Over the recent past the Moruga Red has been purified, stabilised and commercialised in Trinidad and Tobago. Other selections derived from the Regional gene pool such as the Scotch Bonnet, Tiger Teeth, Red Congo and Cayenne were also purified and stabilised. The Scotch Bonnet was improved through a backcross programme implemented in Jamaica. The cross between Scotch Bonnet x Bird Pepper resulted in two selections, Joyce and Phyllis, with yellow berries. As the hot pepper industry grew in CARICOM, CARDI led the way in also developing a sustainable commercial seed production system linking Barbados, Antigua and Belize. The positive impact made by both genetic improvement and the steady supply of high quality seed on the overall growth of the hot pepper industry, was briefly described. Emphases should be placed on breeding for resistances and the expression of hybrid vigour in future work.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Genome sequence of the hot pepper provides insights into the evolution of pungency in *Capsicum* species

Seungill Kim, et.al
2014. Nature Genetics 46:270 - 278

Abstract

Hot pepper (*Capsicum annuum*), one of the oldest domesticated crops in the Americas, is the most widely grown spice crop in the world. We report whole-genome sequencing and assembly of the hot pepper (Mexican landrace of *Capsicum annuum* cv. CM334) at 186.6× coverage. We also report resequencing of two cultivated peppers and *de novo* sequencing of the wild species *Capsicum chinense*. The genome size of the hot pepper was approximately

fourfold larger than that of its close relative tomato, and the genome showed an accumulation of *Gypsy* and *Caulimoviridae* family elements. Integrative genomic and transcriptomic analyses suggested that change in gene expression and neofunctionalization of capsaicin synthase have shaped capsaicinoid biosynthesis. We found differential molecular patterns of ripening regulators and ethylene synthesis in hot pepper and tomato. The reference genome will serve as a platform for improving the nutritional and medicinal values of *Capsicum* species.

FREE copy of full article available at <http://www.nature.com/ng/journal/v46/n3/full/ng.2877.html#an1>
<http://www.nature.com/ng/journal/v46/n3/pdf/ng.2877.pdf>

509-45-1, a *Capsicum annuum* pepper germplasm containing high concentrations of capsinoids

Robert L. Jarret, Jason Bolton and L. Brian Perkins

2014. HortScience 49:107-108

<http://hortsci.ashspublications.org/content/49/1/107.full>

New *Capsicum annuum* pepper contains high concentrations of beneficial capsinoids

2014. American Society for Horticultural Science (ASHS) Press Release, 22 April 2014

<http://www.ashs.org/news/169898/New-Capsicum-annuum-pepper-contains-high-concentrations-of-beneficial-capsinoids.htm>

Full Article

Recent release of germplasm gives plant breeders, researchers new source of capsinoids

ORONO, ME--Researchers have released a new *Capsicum annuum* pepper germplasm that contains high concentrations of capsinoids. The release was announced in the January 2014 issue of *HortScience* by researchers Robert L. Jarret from the USDA/Agricultural Research Service in Griffin, Georgia, in collaboration with Jason Bolton and L. Brian Perkins from the Department of Food Science and Human Nutrition at the University of Maine.

According to the report, the germplasm called "509-45-1" is a small-fruited *Capsicum annuum* L. pepper. Fruit of 509-45-1 contain high concentrations of capsiate in both immature and mature fruit. "The release of 509-45-1 will provide researchers and plant breeders with a new source of capsinoids, thus facilitating the production of and further research on these non-pungent biologically active compounds," Jarret said.

Pungent capsaicinoids--the compounds found in the capsicum family of plants that give them their signature heat--have many benefits. Unfortunately, their use as ingredients in foods and pharmaceuticals has been limited by the very characteristic that makes them popular as a spice--their pungency. Non-pungent capsinoids, analogs of capsaicinoids, were first isolated from a sweet pepper cultivar. Capsinoids offer similar types of biological activity as capsaicinoids without the pungency, and are known to provide antioxidant activity, enhance adrenal function, promote metabolism, and suppress body fat accumulation.

The scientists began the breeding process in 2005 by screening 120 *Capsicum annuum* cultivars for the occurrence of capsinoids. Further selections eventually resulted in a single plant bearing immature fruit that contained greater than 1000 ug·g⁻¹ FW capsinoids with no detectable capsaicinoids. Seeds harvested from this plant were subsequently designated as 509-45-1.

Small quantities of seed of 509-45-1 are available for research purposes from Dr. Jarret. Genetic material of the release has been deposited in the National Plant Germplasm System, and is available for research purposes, including the development and commercialization of new varieties/cultivars. The researchers request appropriate recognition if 509-45-1 contributes to research, to production of capsinoids, or to development of breeding lines or cultivars.

The complete study and abstract are available on the ASHS *HortScience* electronic journal web site: <http://hortsci.ashspublications.org/content/49/1/107.full>

COMMODITIES: COCONUTS

Global Strategy for the Conservation and Use of Coconut Genetic Resources 2014-2023: a draft summary

2014. International Coconut Genetic Resources Network (COGENT), July 2014

This brochure summarises the full draft version of the Global Strategy for the Conservation and Use of Coconut Genetic Resources (the Strategy): a draft summary. It introduces the main objectives of the Strategy, and the context and status of coconut germplasm conservation and use and outlines what remains to be done. The new version of the Strategy and its implementation and workplan will be finalized during and beyond the 2014 COGENT SC meeting in Sri Lanka, July 2014.

http://www.cogentnetwork.org/images/publications/Brochure_strategy_coconut_2014v2.pdf

Laboratory production of Red Palm Mite *Raoiella indica* hirst (Acari:Tenuipalpidae) and the parasitoid *Amblyseius largoensis* (Acari: Phytoseiidae) in Trinidad

P Ram, C Lakhan, A Sujatha, J Lawrence and B Lauckner

2013. Proceedings of the Caribbean Food Crops Society 49:537

Abstract

The Red Palm Mite Hirst (Acari: Tenuipalpidae) a pest of Asian origin was reported in Trinidad in 2006. Through the Indian Technical and Economic Cooperation Programme laboratory protocols were developed for rearing *Amblyseius largoensis* (Acari: Phytoseiidae) a predatory mite of the Red Palm Mite *Raoiella indica* Hirst (Acari: Tenuipalpidae) (RPM) in Trinidad. This paper focuses on two methods developed and adapted to facilitate production under local conditions for augmentative field releases. These methods include rearing the natural enemy on RPM infested coconut seedlings and on coconut pinnae in containers.

Keywords: Red Palm Mite, *Raoiella indica*, Natural Enemy, Predatory Mite, Laboratory Production, *Amblyseius largoensis*, Trinidad.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Workshop report Coconut Industry Development for the Caribbean: Towards a Shared Vision and Road Map, October 7th – 8th, 2013, held during the 2013 Caribbean Week of Agriculture, Georgetown Guyana

I Ivey, J Francis and J Lawrence

2013. St Augustine, Trinidad and Tobago: Caribbean Agricultural Research and Development Institute / Wageningen, The Netherlands: Technical Centre for Agricultural and Rural Cooperation.

<http://www.cardi.org/wp-content/uploads/downloads/2014/04/Coconut-Workshop-Outcomes-Report-Full-Version-Final-Proof-Corrected-24022014.pdf>

COMMODITIES: FRUITS & VEGETABLES

AVOCADO:

The efficacy of combined application of edible coatings and thyme oil in inducing resistance components in avocado (*Persea americana* Mill.) against anthracnose during post-harvest storage

Malick Bill, Dharini Sivakumar, Lise Korsten, A. Keith Thompson

2014. Crop Protection 64:159-167

Abstract

Avocado fruit has high economic value; however, major post-harvest losses are encountered throughout the supply chain mostly due to anthracnose disease caused by the fungus *Colletotrichum gloeosporioides*. Increasing consumer concern regarding food safety and demand for organically produced fruits makes it necessary to search for natural environmentally friendly alternative products and processes for the fruit industry; particularly in disease control. Antifungal effects of Gum Arabic (GA) (10%), *Aloe vera* (AL) (2%), chitosan (CH) (1%) alone or in combination with thyme oil (1%) were investigated *in vitro*. CH + thyme oil and AL + thyme oil [1:1 or 3:1 v/v] showed fungicidal effects while AL, CH, GA and GA + thyme oil [3:1 v/v] showed fungistatic effects on mycelial growth of *C. gloeosporioides* *in vitro*. CH and AL coatings alone or in combination with thyme oil [3:1 v/v], either as preventative or curative treatments in comparison with commercial treatment (prochloraz, 0.05%) and untreated control were evaluated on incidence and severity (lesion diameter) of anthracnose *in vivo*. Preventative CH + thyme oil treatments significantly reduced the severity of anthracnose (8.9 mm) compared to thyme oil (12.7 mm), AL + TO (14.4 mm), CH (17.8 mm), AL (20.6 mm), PZ (18.3 mm) and untreated samples (34.8 mm). As curative method, the CH + thyme oil combination also reduced the severity of anthracnose by at least 4 mm compared to the other treatments. The total phenols, polyphenol oxidase, phenylalanine ammonia-lyase, β -1,3-glucanase, chitinase, catalase and superoxide dismutase activities, firmness and flesh colour were also determined. Results showed an increase in peroxidase, phenylalanine ammonia-lyase, β -1,3-glucanase, chitinase, catalase and superoxide dismutase activities and total phenolics with reduced loss of firmness and flesh colour following CH + thyme oil treatments. This investigation recommends CH + thyme oil [3:1 v/v] combination treatment as a suitable alternative to the currently adopted prochloraz applications in controlling anthracnose disease in avocado fruit during storage.

Keywords: Postharvest decay; *Colletotrichum gloeosporioides*; Antioxidant enzymes; Chitosan; *Aloe vera*; Essential oil

<http://www.sciencedirect.com/science/article/pii/S0261219414002002>

Pruning after flooding hastens recovery of flood-stressed avocado (*Persea americana* Mill.) trees.

Maria Angelica Sanclemente, Bruce Schaffer, Pilar M. Gil, Ana I. Vargas, Frederick S. Davies.

2014. Scientia Horticulturae 169:27–35

Abstract

Two experiments (Expts. 1 and 2) were conducted at different times with avocado (*Persea americana* Mill. cv. Choquette) trees in containers to test the effects of leaf pruning immediately after removing trees from short-term flooding on tree recovery. Trees in each experiment were divided into two flooding treatments: (1) flooded, or (2) non-flooded. Trees in each flooding treatment were divided into two pruning treatments: (1) pruned; approximately two-thirds of the canopy removed by pruning immediately after trees were removed from flooding (unflooded), or (2) non-pruned. In each experiment, net CO₂ assimilation (*A*), stomatal conductance of water vapor (*g_s*), transpiration (*E*), water use efficiency (WUE, calculated as *A/E*) and xylem sap flow (in Expt. 2) were determined daily during the flooding period and periodically after trees were unflooded until harvest time in each flooding/pruning treatment. Tissue dry weights were determined for trees in all treatments at the end of the experiment (several weeks after trees were unflooded). Net CO₂ assimilation, *g_s*, *E* and WUE of flooded trees decreased after 2 and 5 days and trees were unflooded after 3 and 6 days in Expts. 1 and 2, respectively. After trees were unflooded, *A*, *g_s*, *E* and WUE were lower in flooded trees than in non-flooded trees for a few weeks, but these reductions were greater for pruned than non-pruned trees. Eventually, *A*, *g_s*, *E* and WUE of flooded trees in both the

pruned and non-pruned treatments returned to values similar to those of non-flooded trees. After trees were unflooded, for trees in the pruned treatment, xylem sap flow was generally not significantly affected by flooding. However, for non-pruned trees, xylem sap flow was usually lower in the flooded than non-flooded trees. In each experiment, leaf dry weight and total plant dry weight were significantly lower for flooded than non-flooded trees only in the non-pruned treatments. In Expt. 2, root and stem dry weights were also lower in flooded than non-flooded trees only in the non-pruned treatment. The results indicate that pruning the canopy of avocado immediately after trees are removed from short-term flooding hastens plant recovery. It is postulated that the hastened recovery was due to pruning bringing the shoot to root ratio of flooded trees (with damaged roots) and the subsequent supply and demand for water and nutrients into better equilibrium in flooded trees, allowing pruned trees to recover more quickly from flooding compared to non-pruned trees.

Keywords: Avocado; Flooding; Pruning; Net CO₂ assimilation; Stomatal conductance; Xylem sap flow
<http://www.sciencedirect.com/science/article/pii/S0304423814000491>

BANANA:

Citrate and malate accumulation in banana fruit (*Musa* sp. AA) is highly affected by genotype and fruit age, but not by cultural practices

A. Etienne, M. Génard, D. Bancel, S. Benoit, G. Lemire, C. Bugaud
2014. *Scientia Horticulturae* 169:99–110

Abstract

Sourness and sweetness are major drivers of consumer preference for banana fruits and are mainly linked to the presence of citrate and malate. The objectives of the present work were to determine how agro-environmental and genotypic factors affect the concentrations of citrate and malate in banana pulp during growth and postharvest ripening. Changes in citrate and malate concentrations in the pulp during the development of the fruit were investigated in relation to fruit age, fruit load, and potassium fertilization in three cultivars of dessert banana presenting contrasted acidity at the eating stage. Major differences in the pattern of citrate and malate accumulation were found in the three cultivars both during growth and postharvest ripening. The fruit growth rate was greater when the fruit load was reduced, but this treatment had no effect on the accumulation of organic acids in any of the three cultivars. A high potassium supply increased fruit growth but had no effect on organic acid accumulation in any of the three cultivars. Late harvested fruits had higher citrate and lower malate concentrations in the pulp at the eating stage. Our results showed that the concentration of organic acids in banana pulp is mainly controlled by genotype and that this may be an interesting trait to target in breeding programs to improve the organoleptic quality of new cultivars. The physiological mechanisms likely to control the accumulation of citrate and malate during banana fruit development are discussed.

Keywords: Cultivars; Citric acid; Fruit load; Potassium fertilization
<http://www.sciencedirect.com/science/article/pii/S0304423814000867>

FAO response to the Black Sigatoka disease problem in the Caribbean

V.F. Lopez and L. Perez-Vicente

2013. *Proceedings of the Caribbean Food Crops Society* 49:539-548

Abstract

Black Sigatoka disease (BSD), caused by *Mycosphaerella fijiensis*, is considered to be the most widespread and destructive disease of banana. The first outbreak in the Caribbean occurred in Cuba in 1991, and subsequently spread throughout the region. In all affected countries, BSD has had serious economic, social and environmental impact, causing yields losses of 30-50 % and significant (nearly 25%) rise in production costs. Five recently-affected countries (Dominica, Grenada, Guyana, St. Lucia and St. Vincent and Grenadines) requested technical assistance from the Food and Agriculture Organization (FAO) to carry out an assessment of ongoing national management programmes. A Regional Project was formulated accordingly under the Technical Cooperation Programme (TCP). Titled *Development of Integrated Programmes and Action Plan for Black Sigatoka Management in five countries of the Caribbean*, the project had four outputs, key among them being the formulation and endorsement, in each country, of a comprehensive National Management plan. The project had the endorsement and

support of all Regional partners. The activities were undertaken by an Expert Consultant from Cuba between June and December 2012. In each country, the Consultant conducted an assessment of the existing management practices, benchmarked against well-studied and scientifically-sound practices. Recommendations made to fill the gaps formed the basis of the National Actions Plans for each of the five countries. Activities that could be undertaken at the Regional level were extracted from the National Plans and were included in the Regional Action Plan. Six draft proposals were also prepared (five National and one Regional). It is anticipated that the proposals will assist the countries and the Regional partners in mobilizing resources (both existing and potential) towards the long-term, sustainable management of BSD in the Caribbean

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

CITRUS GREENING DISEASE:

Association of ‘*Candidatus Liberibacter asiaticus*’ root infection, but not phloem plugging with root loss on Huanglongbing-affected trees prior to appearance of foliar symptoms

E. G. Johnson, J. Wu, D. B. Bright and J. H. Graham

2014. *Plant Pathology* 63:290-298

Abstract

Huanglongbing (HLB) is a systemic disease of citrus caused by phloem-limited bacteria ‘*Candidatus Liberibacter*’ spp. with ‘*Ca. Liberibacter asiaticus*’ (Las) the most widespread. Phloem-limited bacteria such as liberibacters and phytoplasmas are emerging as major pathogens of woody and herbaceous plants. Little is known about their systemic movement within a plant and the disease process in these tissues. Las movement after initial infection was monitored in leaves and roots of greenhouse trees. Root density, storage starch content, and vascular system anatomy in relation to Las presence in field and greenhouse trees, both with and without symptoms, showed the importance of root infection in disease development. Las preferentially colonized roots before leaves, where it multiplied and quickly invaded leaves when new foliar flush became a sink tissue for phloem flow. This led to the discovery that roots were damaged by root infection prior to development of visible foliar symptoms and was not associated with carbohydrate starvation caused by phloem-plugging as previously hypothesized. The role of root infection in systemic insect-vectored bacterial pathogens has been underestimated. These findings demonstrate the significance of early root infection to tree health and suggest a model for phloem-limited bacterial movement from the initial insect feeding site to the roots where it replicates, damages the host root system, and then spreads to the rest of the canopy during subsequent leaf flushes. This model provides a framework for testing movement of phloem-limited bacteria to gain greater understanding of how these pathogens cause disease and spread.

Keywords: bacterial movement; ‘*Candidatus Liberibacter asiaticus*’; carbohydrates; citrus greening; phloem-limited pathogen

<http://onlinelibrary.wiley.com/doi/10.1111/ppa.12109/abstract>

Citrus Greening or Huanglongbing in the Caribbean – FAO’s response

V. Lopez, T. Santivañez, L. Myers-Morgan, V. Manzanero-Majil, and J. Thomas

2013. *Proceedings of the Caribbean Food Crops Society* 49:563-574

Abstract

Citrus Greening or Huanglongbing (HLB) is a devastating disease of citrus. All varieties are susceptible and there is no known cure for the disease. Trees decline to uneconomic production levels within 1-10 years, depending on tree age. HLB is spreading rapidly in the Americas (Brazil, United States of America, Mexico, Central America, Cuba, Dominican Republic, Jamaica, Belize and most recently, Dominica and Paraguay). The disease is vectored by the Asian Citrus Psyllid, *Diaphorina citri*, which is present in many Caribbean islands and increases the risk of introduction and spread of HLB. Based on a request for support from affected Member States, the Food and Agriculture Organization (FAO) implemented two national projects under its Technical Cooperation Programme (TCP). The first project in Jamaica (October 2010 to March 2013) aimed to build national capacity to effectively respond to the HLB. The second project in Belize (February 2012 to July 2013) complemented ongoing activities to better protect the citrus industry. A third project, at a regional level, covering all the countries of Latin America and

the Caribbean and led by the FAO Regional Office for Latin America and the Caribbean (RLC) began implementation in December 2012 with a Meeting of the Committee of Experts. This project was the outcome of a Regional Workshop held in June 2011 in Santiago, Chile, at which FAO was mandated to develop and lead a hemispheric effort for HLB management and networking. Some highlights of the three projects are presented. http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Occurrence of Citrus Greening (Huanglongbing) in Barbados

2014. International Plant Protection Convention (IPPC). Pest Report Date: 03 Feb 2014. Report Number: BRB-06/3

<https://www.ippc.int/countries/barbados/pest-reports/occurrence-citrus-greening-huanglongbing-barbados>

COMMODITIES: CROPS – CROP PROTECTION

The Manual of Biocontrol Agents

Dr Roma Gwynn (ed.)

2014. British Crop Production Council. 5th ed.

<http://www.bcpc.org/shop/mba.html>

It contains up-to-date, accurate and comprehensive information on over **200** active substances which are commercially available in products including: 90+ micro-organisms; 15+ botanicals; 80+ macro-organisms; 31+ semiochemicals

COMMODITIES: LIVESTOCK

Tropical forages Mulato II grass (*Brachiaria* hybrid, CIAT 36087) and forage sorghum (*Sorghum bicolor*) for silage conservation and sheep production in St. Kitts and Nevis

S. Borucki, A. Hosein, I. Watts, J. Berry, and L.E. Phillip

2013. Proceedings of the Caribbean Food Crops Society 49:362-372

Abstract

Poor nutrition is a major factor limiting the productivity of small ruminants in St. Kitts and Nevis as well as in the wider Caribbean region. Inadequate quantity and quality of natural pastures during the dry season is a major constraint limiting the local supply of sheep and goat meat. The objectives of this study were the establishment of drought-tolerant, high-yielding crops capable of good quality forage that could also be preserved as silage for year-round feeding of small ruminants. Two hectares of Mulato II grass (*Brachiaria* hybrid CIAT 36087) were planted in the dry season during February 2012, with a re-seeded section during April 2012. Forage yield after 12 weeks of successful establishment was 4,783 kg of dry matter (DM) per ha. In July the Mulato grass was harvested and conserved as silage in 153 plastic bags of 20 kg and 550 silage bags of 11 kg, for a total yield of 10,317 kg fresh ensiled material per ha. During the wet season after 3.5 weeks of re-growth, the Mulato grass produced 10,465 kg DM/ha, 2.2 times more forage compared to the dry season. For the forage sorghum (*Sorghum bicolor*), two cycles of Great Scott brown mid-rib were established and harvested: one in the dry season and the other in the wet season, March to May 2012 and November to January 2013, respectively. During the dry season the forage sorghum produced 1,870 kg DM/ha with 81-day of growth, whereas in the rainy season, the forage sorghum produced 1.8 times higher, 3,429 kg DM/ha, with 53-day of growth. Successful establishment in the dry season and forage production during both the dry and wet season proved that Mulato grass and forage sorghum are valid forage options for small ruminant production under the Caribbean weather conditions, with the potential to increase farmers' income and provide year-round meat protein sources for these communities.

Keywords: Mulato grass; forage sorghum; silage conservation.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Supplemental Mulato grass silage fed during the night and sheep production in the Caribbean

S. Borucki, A. Hosein, I. Watts, J. Berry and L.E. Phillip

2013. Proceedings of the Caribbean Food Crops Society 49:386

Abstract

Inadequate quantity and quality of natural pastures during the dry season is a major constraint limiting the production and local supply of sheep and goat meat in the Caribbean. Mulato grass proved that can be successfully established and used for silage in the dry season. A study involving 50 lambs and kids was conducted in five different small holder farms in St. Kitts to determine the effects of supplemental Mulato II grass silage (MGS) in animal performance. All farms had perimeter fencing (dog proof) and enclosure for semi-confined management at night. At 12 weeks of age, the animals were weaned, weighed and randomly assigned to either (MGS) or no supplementation (NS). All animals grazed the natural pasture during the day and were confined with or without MGS during the night. Table 1 shows that feeding Mulato II grass silage during the night did not to improve the low average daily gains achieved by the animals under natural grazing conditions in the Caribbean (50g/d). The potential of Mulato II grass forages fed fresh or conserved as silage needs to be tested feeding the animals during the day

Keywords: Mulato Grass Silage, Sheep Production

http://cfc.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Investing in the livestock sector: why good numbers matter. A sourcebook for decision makers on how to improve livestock data

Ugo Pica-Ciamarra, Derek Baker, Nancy Morgan, Alberto Zezza, Carlo Azzarri, Cheikh Ly, Longin Nsiima, Simplicie Nouala, Patrick Okello, Joseph Sserugga

2014. World Bank, Food and Agriculture Organization of the United Nations and International Livestock Research Institute

<http://www.fao.org/3/a-i3706e/index.html>

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2.2 Improving livestock data quality: experiments for better survey questionnaires

2.3 Physical measures of production for better statistics: the livestock technical conversion factors

2.4 Institutional changes to improve the quantity and quality of administrative livestock data

PART III Livestock data for decision making: evidence and examples

GERMPLASM

Diversifying food and diets: Using agricultural biodiversity to improve nutrition and health

Fanzo, J.; Hunter, D.; Borelli, T.; Mattei, F.(eds.)

2013. Bioersity International, Rome (Italy). 400p.

Explores the current state of knowledge on the role of agricultural biodiversity in improving diets, nutrition and food security. Using examples and case studies from around the globe, the book explores current strategies for improving nutrition and diets and identifies key research and implementation gaps that need to be addressed to successfully promote the better use of agricultural biodiversity for rural and urban populations and societies in transition.

PDF file available free 7.4 M

<http://www.bioersityinternational.org/e-library/publications/detail/diversifying-food-and-diets/>

THEMATIC AREAS: PROTECTED AGRICULTURE

Exploring sweet pepper (*Capsicum annuum*) cultivars for greenhouse production in Trinidad and Tobago

W. Scott, N. Mark, L. Solomon, K. Campo, W.A. Isaac, C. St. Martin, and R. Brathwaite

2013. Proceedings of the Caribbean Food Crops Society 49:126

Abstract

Sweet pepper has become one of the most important crops in greenhouse cultivation in Trinidad and Tobago. Identification of suitable heat tolerant varieties for greenhouse sweet pepper cultivation is, however, a major challenge. The present investigation examined the performance of sweet pepper cultivars (*Capsicum annuum* L.), Geneva, Aristotle, Admiral, Bullnose, and Canape under a protected structure (Gable roof greenhouse) at the University field station (UFS), Valsayn, University of the West Indies, St Augustine Campus Trinidad. Five sweet pepper cultivars were planted in two types of growth media (coconut coir or sharp sand). Yield and fruit quality were assessed among other parameters. Temperatures under the protected agriculture structure were 3-4 °C higher than external temperatures and these conditions impacted on the relative growth rates (RGR). Geneva had the highest RGR in coconut coir (48.0 mg g⁻¹ d⁻¹) and the lowest RGR was recorded in sharp sand for Canape (0.8 mg g⁻¹ d⁻¹). The highest marketable yield was recorded with Admiral grown in coconut coir (1.2 kg/m²) and Aristotle in sharp sand had the lowest yield (0.3 kg/m²). There were no significant effects of media on sweet pepper cultivars. There were significant variations between the performances of the varieties: Admiral produced more than Aristotle, Geneva, Bullnose and Canape.

Keywords: Gable Roof Greenhouse, Sweet Pepper Cultivars, Media.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Exploring tomato (*Solanum lycopersicon*) cultivars for greenhouse production in Trinidad and Tobago

J. James, N. Mark, L. Solomon, K. Campo, W.A. Isaac, E. Bartholomew, C. St. Martin, and R. Brathwaite

2013. Proceedings of the Caribbean Food Crops Society 49:127

Abstract

A tomato (*Solanum lycopersicon*) cultivar trial was conducted at the University Field Station, Valsayn, Trinidad under a gable roof greenhouse. The objective of this trial was to evaluate the performance of tomato cultivars grown under a protected structure for yield and fruit quality. Seven cultivars (Hybrid 61, Versatile, Summer star, IT71, Rhapsody, Caraipe and Striker) planted in coconut coir or sharp sand media were evaluated. There were no significant effects of media on tomato cultivars, but significant variations between the performances of the varieties. Versatile produced the highest number of fruit followed by Hybrid 61 and IT71. IT71 grown in coconut coir however, had the highest marketable fruits (1.33 kg/m²) followed Summer star in coconut coir (0.89 kg/m²) and Hybrid 61 (0.73 kg/m²). Plants in the coconut coir generally performed better and the elemental content of fruits were higher than in the sharp sand media with the exception of IT71 and Versatile.

Keywords: Greenhouse, *Solanum Lycopersicon*, Cultivars, Marketable Fruits.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

THEMATIC AREAS: AGRO-ENERGY

Biofuels and local food security: what does the evidence say?

Anna Locke and Giles Henley

2014. Overseas Development Institute. ODI Briefing no. 86, March 2014

<http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8867.pdf>

Pilot scale simultaneous saccharification and fermentation at very high gravity of cassava flour for ethanol production

Chinh-Nghia Nguyen, Thanh-Mai Le, Son Chu-Ky

2014. Industrial Crops and Products 56:160-165

Abstract

We developed a simultaneous saccharification and fermentation (SSF) process of cassava flour at very high gravity (VHG). Cassava flour (CF) was dissolved in water to reach 315.4 g/l dry matter, and then the mixture was liquefied at 80 °C for 90 min by using alpha-amylase (3532 AAU/kg CF) and beta-glucanase (2812 U/kg CF). SSF of liquefied mash of cassava was performed at 30 °C with the simultaneous addition of two glucoamylases (Distillase ASP at 540 GAU/kg CF and Amigase Mega L at 0.035% w/w), active dry yeast (1.5×10^7 cells/l), urea (12 mM) and KH_2PO_4 (4 mM). Under these conditions, the SSF process finished after 72 h. The ethanol content achieved 17.2% v/v corresponding to 86.1% of the theoretical ethanol yield at lab scale and decreased to 16.5% v/v corresponding to 83.6% of the theoretical ethanol yield at pilot scale. Therefore, the SSF of cassava flour under VHG condition could have a great potential for the ethanol industry in Vietnam and South East Asia.

Keywords: Simultaneous saccharification and fermentation (SSF); Very high gravity (VHG); Ethanol; Cassava flour
<http://www.sciencedirect.com/science/article/pii/S092666901400082X>

THEMATIC AREAS: SOIL AND WATER MANAGEMENT

Impacts of earthworms on soil components and dynamics. A review

Lemtiri A., Colinet G., Alabi T., Cluzeau D., Zirbes L., Haubruge E., Francis F.

2014. Biotechnology, Agronomy, Society and Environment 18:121-133

<http://www.pressesagro.be/base/text/v18n1/121.pdf>

THEMATIC AREAS: NATURAL RESOURCE MANAGEMENT

Evaluating conservation agriculture for small-scale farmers in Sub-Saharan Africa and South Asia

2014. Agriculture, Ecosystems & Environment 187:1-182. Special Issue

Full Articles are **FREE** / open access !! <http://www.sciencedirect.com/science/journal/01678809/187>

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5. Targeting conservation agriculture in the context of livelihoods and landscapes
6. The farm-level economics of conservation agriculture for resource-poor farmers
7. Perceptions and performance of conservation agriculture practices in northwestern Ghana
8. Adoption and intensity of adoption of conservation farming practices in Zambia
9. Conservation agriculture and ecosystem services: An overview
10. Constraints and opportunities for water savings and increasing productivity through Resource Conservation Technologies in Pakistan
11. From adoption claims to understanding farmers and contexts: A literature review of Conservation Agriculture (CA) adoption among smallholder farmers in southern Africa
12. Sense and nonsense in conservation agriculture: Principles, pragmatism and productivity in Australian mixed farming systems
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14. Understanding the impact and adoption of conservation agriculture in Africa: A multi-scale analysis
15. Conservation agriculture in African mixed crop-livestock systems: Expanding the niche

Long-term socio-economic and spatial pattern drivers of land cover change in a Caribbean tropical moist forest, the Cockpit Country, Jamaica

Minke E. Newman, Kurt P. McLaren, Byron S. Wilson

2014. *Agriculture, Ecosystems & Environment* 186:185–200

Abstract

Very little research has considered the underlying drivers of land cover change in Caribbean islands, particularly in those islands that are still experiencing a net loss of forest cover. We investigated the underlying driving forces (socio-economic drivers) and spatial pattern drivers (biophysical features) of both deforestation and reforestation in the Cockpit Country, Jamaica. This area is one of the most globally important sites for plant diversity, but is threatened by clearance for small-scale agriculture. Drivers of change were assessed for both the individual time steps within the study period (1942–2010) and for the entire 68 years using multivariate, spatially explicit, statistical models. The primary drivers of deforestation over the study period were accessibility (gentler slopes, closer to forest edges, more fragmented forests) and greater relative wealth/socio-economic status (increased access to piped water). Reforestation generally increased closer to forest edges and in areas with lower market access (greater distances to roads and towns) and lower wealth/status (increased reliance on pit latrines). We found considerable temporal variation among the most important drivers for each time step, including climate, employment status, population density, population age structure and relative wealth. Forest reserve status was not a key determinant of deforestation but did increase the probability of reforestation between 1961 and 1980. During the final time step (2001–2010) access was less important as a deterrent to deforestation, which increased within the most contiguous forest blocks. If the deforestation drivers of the last decade do not change, deforestation is predicted to occur within the forest reserves, and in the largest, least fragmented forest blocks. Thus, conservation and management strategies for our study site must seek to address issues related to both enforcement and the socio-economic factors that influence deforestation and habitat fragmentation.

Keywords: Land-use change; Jamaica; Tropical forest; Deforestation; Reforestation; Multiple logistic regression
<http://www.sciencedirect.com/science/article/pii/S016788091400053X>

CLIMATE CHANGE:

Climate Change 2014: Impacts, Adaptation, and Vulnerability

2014. Working Group II of the Intergovernmental Panel on Climate Change (IPCC). IPCC, 31 March 2014

The Summary for Policymakers of the Working Group II contribution to the Fifth Assessment Report was approved, and the full report accepted, by the IPCC on 30 March 2014.

- *Summary for Policymakers* http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf

- *Full report* <http://www.ipcc.ch/report/ar5/wg2/>

- *Chapter 29. Small Islands* http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap29_FGDall.pdf

THEMATIC AREAS: Herbals – Lemon grass

The control of isariopsis leaf spot and downy mildew in grapevine cv. Isabel with the essential oil of lemon grass and the activity of defensive enzymes in response to the essential oil

A.J. Maia, J.S.B. Oliveira, K.R.F. Schwan-Estrada, C.M.R. Faria, A.F. Batista, W.F. Costa, B.N. Batista
2014. *Crop Protection* 63:57-67

Abstract

The aim of this study was to evaluate the potential of the essential oil of lemon grass (*Cymbopogon citratus*) for the control of isariopsis leaf spot (*Pseudocercospora vitis*) and downy mildew (*Plasmopara viticola*) in grapevine cv. Isabel, the effect of the essential oil on the productivity of the grapevines and the effect of the essential oil on the activity of the enzymes chitinase and catalase. The experiment was conducted in a commercial vineyard over two consecutive crop cycles. Each plant in the experiment was subjected to one of the following nine treatments: 0, 0.5, 1.0, 2.0 or 4.0 mL L⁻¹ essential oil, Tween[®] 80%, Bordeaux mixture, Acibenzolar-S-methyl and mancozeb. An analysis of the area under the disease progress curve showed a quadratic response by both diseases to the doses of essential oil during the first and second crop cycles. The essential oil treatments also increased the number and mass of the clusters of fruit as well as the productivity and desirable chemical characteristics of the grape. The activity of chitinase increased as a result of the essential oil treatments, whereas the activity of catalase decreased. The essential oil at doses of 1.0 and 2.0 mL L⁻¹ can serve as an alternative means of controlling isariopsis leaf spot and downy mildew and can also serve to improve the fruit quality of grapes cv. Isabel in tropical regions.

Keywords: *Vitis vinifera*; Grapes; Induced resistance; Catalase; Chitinase; lemon grass; *Cymbopogon citratus*
<http://www.sciencedirect.com/science/article/pii/S0261219414001598>

OTHER AGRICULTURAL ASPECTS

AGRICULTURAL DEVELOPMENT – GUYANA

National Strategy for Agriculture in Guyana 2013-2020

2014. Guyana. Ministry of Agriculture

<http://agriculture.gov.gy/National%20Agriculture%20Strategy%202013-2020.pdf>

AGRICULTURAL DEVELOPMENT - JAMAICA

[Jamaica]. Minister of Agriculture and Fisheries, the Hon. Roger Clarke Contribution to the 2014/2015 Budget Debate: Continuing the growth... going for export

<http://jis.gov.jm/media/budget-spc.pdf>

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>

[Jamaica]. Ministry of Agriculture and Fisheries papers

<http://jis.gov.jm/government/documents/ministry-agriculture-fisheries-mpapers-48-602014/>

On Wednesday, April 23, 2014, during his contribution to the 2014/2015 Budget Debate, Minister of Agriculture and Fisheries, the Hon. Roger Clarke tabled 13 Ministry Papers, detailing our activities and successes. They are listed as follows:

1. Ministry Paper 48/2014: **Agro Park Development Programme** <http://jis.gov.jm/media/Ministry-Paper-48-Agro-Park.pdf>
2. Ministry Paper 49/2014: **Strengthening Agriculture Education and Research** <http://jis.gov.jm/media/Ministry-Paper-49-Strengthening-Agriculture-Education-and-Research.pdf>
3. Ministry Paper 50/2014: **Aquaculture Development Initiatives** <http://jis.gov.jm/media/Ministry-Paper-50-Aquaculture-2014.pdf>

4. Ministry Paper 51/2014: **Food Safety Initiatives** <http://jis.gov.jm/media/Ministry-Paper-51-Food-Safety-April-2014-final.pdf>
5. Ministry Paper 52/2014: **Ginger Industry Expansion Programme** <http://jis.gov.jm/media/Ministry-Paper-Ginger-52-Programme-2014.pdf>
6. Ministry Paper 53/2014: **Irish Potato Production Programme** <http://jis.gov.jm/media/Ministry-Paper-53-Irish-potato-Programme-Final.pdf>
7. Ministry Paper 54/2014: **Jamaica Dairy Development Board** http://jis.gov.jm/media/Ministry-Paper-54-Dairy-Development-Board_April-2014-2.pdf
8. Ministry Paper 55/2014: **Report on activities in furtherance of the proper management of the Pedro Cays** <http://jis.gov.jm/media/Ministry-Paper-55-on-Pedro-Cays-April-2014.pdf>
9. Ministry Paper 56/2014: **Praedial Larceny** <http://jis.gov.jm/media/Ministry-Paper-56-on-Praedial-Larceny-April-2014.pdf>
10. Ministry Paper 57/2014: **Interventions in the School Feeding Programme** <http://jis.gov.jm/media/Ministry-Paper-57-School-Feeding-Programme.pdf>
11. Ministry Paper 58/2014: **Small Stock Industry** <http://jis.gov.jm/media/Ministry-Paper-58-Small-Stock-April-2014-final-3-41.pdf>
12. Ministry Paper 59/2014: **Report on the Achievements of the Sugar Transformation Unit (STU), Ministry of Agriculture and Fisheries** http://jis.gov.jm/media/MINISTRY-PAPER_-59-STU-ACHIEVEMENTS-FY-2013_14-2.pdf
13. Ministry Paper 60 /2014: **Divestment of The Wallenford Coffee Company and Also The Commercial Assets of The Cocoa Industry Board** <http://jis.gov.jm/media/Ministry-Paper-60-on-Divestment-of-WCC-CIB-Apr2014.pdf>

FOOD SECURITY:

Crop yields and global food security: will yield increase continue to feed the world?

Fischer, R. A., Byerlee, D., & Edmeades, G. O.

2014. Canberra: Australian Centre for International Agricultural Research

<http://aci-ar.gov.au/publication/mn158>

Read online [open access] at <http://aci-ar.gov.au/files/mn-158/index.html>

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7. Other crops: **cassava, sweet potato, pulses, peanut, sugarcane**
8. Closing yield gaps
9. Increasing potential yield
10. **Climate change, crop yield, adaptation and mitigation**
11. Resource use efficiency, sustainability and environment
12. Trends in total factor productivity
13. Policies and people

The Future of FOOD: How to feed our growing planet

<http://food.nationalgeographic.com/>

National Geographic Society and the Food and Agriculture Organization of the United Nations (FAO) from May to December 2014 will present in-depth reports on food issues.

The next global breadbasket: how Latin America can feed the world: a call to action for addressing challenges and developing solutions

Ginya Truitt Nakata, Margaret Zeigler

2014. Inter-American Development Bank. (IDB Monograph; 202)

<http://publications.iadb.org/handle/11319/6436>

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The Way Forward: Accelerating LAC Agriculture

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1 Boost Commitments to Agricultural Science, Research and Development by Public and Private Sectors

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6 Improve Farmers' Access to Financial Services: Managing Risk and Availability of Credit

7 Strengthen Cooperatives and Producer Associations

8 Reduce Post-Harvest Losses

OECD-FAO Agricultural Outlook 2014-2023

2014. OECD Publishing, 11 July 2014

http://www.keepeek.com/Digital-Asset-Management/oecd/agriculture-and-food/oecd-fao-agricultural-outlook-2014_agr_outlook-2014-en#page3

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- *OECD-FAO Agricultural Outlook 2014 (Summary in English)*

http://www.keepeek.com/Digital-Asset-Management/oecd/agriculture-and-food/oecd-fao-agricultural-outlook-2014/summary/english_0bcb64ab-en#page1

Sustainable Intensification of European Agriculture: A review sponsored by the RISE

Allan Buckwell, Andreas Nordang Uhre, Annabelle Williams, Jana Polakova, Winfried E H Blum, Jasmin Schiefer, Georg J Lair, Alois Heissenhuber, Peter Schießl, Christine Kramer and Wolfgang Haber (contributors)

2014. Rural Investment Support for Europe (RISE) Foundation, Brussels

<http://gallery.mailchimp.com/7e5f446a883c6b513832bd781/files/a6b31c96-e4f0-405d-bc1a-b1c557c47e9.pdf>

The concept of Sustainable Intensification (SI) is used in the context of feeding a global population expected to reach 9 billion by 2050. The RISE report comprises the first analysis of SI in a European context, and argues it must be the paradigm within which future agricultural policy is made in the EU.

The report makes three key points:

1. The agricultural input which needs to be intensified across all of Europe is knowledge per hectare. This means knowledge in managing delicate ecosystems, knowledge to ensure that pollinator populations thrive, knowledge to make water management minimise flooding, as well as knowledge to achieve more food output per hectare.
2. The EU needs to devise a measurement tool for environmental farming performance. It would be strongly preferable to build on an EU-wide set of indicators already developed, for example the Joint Research Centre's IRENA indicators.

3. In addition to better enforcement of existing environmental regulations, and using policy measures under the CAP, changes in farming practices must also come from farmers and private actors themselves. Many companies up- and downstream already operate sustainability schemes, some of which are reviewed in the report. These should be strengthened and broadened, with more efforts to monitor and demonstrate their impact.

INFORMATION AND COMMUNICATION:

An assessment of the market and other information needs of crop farmers in Trinidad and Tobago

N. Felix, G. Seepersad, and A. Iton

2013. Proceedings of the Caribbean Food Crops Society 49:157-166

Abstract

The market and other types of information needs of farmers have increased in importance with the demand for food production worldwide. Agricultural Information can be important for the sustainability of farm production, since it can ensure farmers receive revenues, which can be reinvested into continued production. This paper investigates the market information needs of farmers in Trinidad and Tobago, to assess if it is being met and what information they consider most important. The Likert scale was employed to achieve this objective by rating the importance of various types of information. Point Score Analysis was used to determine the factors which were identified as important among vegetable crop farmers. Contrary to expectations, the study found that crop farmers ranked weather and climate information most important while market price information was ranked 11th. The study also highlighted the importance of other types of information which can potentially improve the sustainability of domestic crop production in Trinidad and Tobago.

Keywords: Market Information, Agricultural Information, Likert Scale, Point Score Analysis.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

Market information delivery: determination of the media and the frequency preferred by crop farmers in Trinidad and Tobago

N. Felix, G. Seepersad, and A. Iton

2013. Proceedings of the Caribbean Food Crops Society 49:207-221

Abstract

Agricultural Market information provides farmers with vital data which can improve their competitiveness, productivity and ultimately improve food and nutritional security in a country. Various worldwide agricultural market information systems provide a wide range of information to its users, but focuses on the delivery methods. Delivery methods increase in importance in Asian and Sub-African countries where many constraints exist, such as distance to market, access to mobile services and the availability of electricity. Although Trinidad and Tobago has an abundance of energy resources, information media and mobile networks, farmers could still be disadvantaged in the method used to disseminate market information. In addition, receiving market information at a frequency unsuitable to its users decreases the effectiveness of such information. Currently, domestic crop wholesale market prices are provided daily and monthly, via the internet and short message services (SMS), but the use among farmers have been shown to be approximately 44%. Therefore, this study sought to identify the media preferred by farmers and the frequency at which this information should be delivered. A structured questionnaire allowed the study to identify the preferred frequency and the media for the delivery of market information. The Chi-square model was also employed to identify if any significant relationships existed between the demographical characteristics of farmers, the media they preferred, and the frequency of delivery. The study found that print media was most preferred among crop farmers and information should be delivered on a daily basis. It should be noted that the media and frequency differed according to the type of information farmers required. The results of the study can guide policy makers in the development of a more effective market information system.

Keywords: Media, Agricultural Market Information, Log linear, Frequency.

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

INTELLECTUAL PROPERTY:

Case study: Allocation of shares of jointly developed results

2014. European Commission's Executive Agency for Small and Medium-sized Enterprises (EASME). European IPR Helpdesk, February 2014

Ownership over the intellectual property arising as a result of innovation is one of the most critical issues to resolve in the framework of collaborative projects, especially in cases where two or more partners generate results jointly. http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/CS_Allocation_of_shares_of_jointly_developed_results.pdf

VALUE CHAINS:

Value chain strengthening of protected agriculture and root & tuber industries in Jamaica through CARDI

N. Reid, D. Erskine-Jones, W. Lawrence, D. Clarke Harris, and L. Johnson

2013. Proceedings of the Caribbean Food Crops Society 49:71-77

Abstract

The Caribbean Agricultural Research and Development Institute (CARDI) through funding from the Common Fund for Commodities (CFC) and the European Union (EU) engaged in projects to strengthen and develop stakeholders in both the protected agriculture and root and tuber industries across six countries in the Caribbean viz. Jamaica, Haiti, Dominica, St. Vincent, Barbados and Trinidad & Tobago. These projects were launched in 2010, with an emphasis on targeting challenges in the respective value chains for each country. Our aim was to strengthen them with the appropriate interventions and necessary linkages among producers, processors, markets and consumers. With focus on the Jamaican value chains explored under the project, needs assessment were conducted to identify specific challenges being faced by the producer and processor groups. The output of these assessments gave rise to the development of appropriate of appropriate group dynamics programmes, technical training sessions and group transformation interventions for one greenhouse producer group, and six root and tuber producer groups. Processor groups have been exposed to technical sessions on food safety; and strategic linkages developed along the value chain, promoting food security and providing sustainable economies through agribusiness. One of the main highlights which capture the essence of the project objectives is observed in a cassava producer group, Bernard Lodge United Progressive Farmers, being developed into a farmers' cooperative after going through the necessary training and sensitizations; and also being linked into clusters with processors and other stakeholders which promote the use of cassava in diverse culinary creations to encourage consumers to utilize these foods in new ways.

Keywords: CARDI, Value Chain, Agribusiness, Protected Agriculture, Roots and Tubers

http://cfcs.eea.uprm.edu/sites/default/files/CFCS%202013%20Vol.%2049%20rs_0.pdf

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