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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
- Dairy cattle

Thematic Areas

- Emerging issues (agro-energy, herbals, organics, protected agriculture)
- Soil & water management
- Seed & seedling nurseries
- Natural resource management (climate change, invasive species)
- Biotechnology
- Livestock feed, particularly forages

These are the priority commodities and thematic areas in the Medium-Term Plan (2008/2010) 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.

The R&D in Agriculture: a bulletin on information resources is a product of CARDI’s Information & Communications Unit.

Frequency: Biannual

PSC No: HQ/002/11
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FARMING SYSTEMS

Good Agricultural Practices (GAP) / farm management manual
Caribbean Agricultural Research and Development Institute, (Belize).
2010. CARDI, Belize. 21p.
Prepared by CARDI for UNDP & Ministry of Economic Development, Belize. Agriculture Enterprise Development for Rural Belize (AED) project
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868-645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org

Manual on Integrated Farming Systems (IFS)
Caribbean Agricultural Research and Development Institute, (Belize).
2010. CARDI, Belize. 56p.
Prepared by CARDI for UNDP & Ministry of Economic Development, Belize. Agriculture Enterprise Development for Rural Belize (AED) project
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868-645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org

CROPS: GENERAL

GENERAL:

Post harvest

Manual for the design, establishment and operation of packing houses and processing unit for Belize
Pilgrim, R (CARDI)
2010. CARDI, Belize. 18p.
Prepared by CARDI for UNDP & Ministry of Economic Development, Belize. Agriculture Enterprise Development for Rural Belize (AED) project
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868-645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org

Post harvest management manual for better quality produce
Caribbean Agricultural Research and Development Institute, (Belize).
2010. CARDI, Belize. 30p.
Prepared by CARDI for UNDP & Ministry of Economic Development, Belize. Agriculture Enterprise Development for Rural Belize (AED) project
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868-645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org
CASSAVA:

Post-harvest

_Tolerance to Postharvest Physiological Deterioration in cassava roots_
2010. _Crop Science_ 50:1333-1338

Abstract. Cassava (_Manihot esculenta_ Crantz) roots spoil 2 to 3 d after harvest because of postharvest physiological deterioration (PPD), which has remained an unsolved problem. Roots from different sources of germplasm were evaluated 5, 10, 20, and 40 d after harvest and some were found to be tolerant to PPD. Three genotypes showed zero levels of PPD even 40 d after harvest. Tolerance to PPD in roots with high carotenoid levels may be explained by their antioxidant properties. Irradiation of seeds in mutagenized populations may have silenced one of the genes involved in the expression of PPD. The tolerance to PPD found in other sources cannot be properly explained. The identification of several sources of resistance (and at least two different modes of action) suggests that now there are alternatives available for solving this problem, benefiting millions of resource-limited farmers worldwide.

https://www.agronomy.org/publications/cs/abstracts/50/4/1333

SWEET POTATO:

Germplasm / Breeding

_Morphological characterization of Ugandan sweetpotato germplasm_
B. Yada, P. Tukamuhabwa, A. Alajo and R. O. M. Mwanga
2010. _Crop Science_ 50:2364-2371

Abstract. Sweetpotato (_Ipomoea batatas_ (L.) Lam) is a widely grown and consumed root crop in Uganda. A total of 1303 accessions of sweetpotato germplasm collected from 21 districts of Uganda were planted for morphological characterization. Forty morphological descriptors were scored on 1256 accessions 90 to 100 d after planting. Stepwise discriminant analysis showed that the discriminating power of 20 morphological traits was sufficient to differentiate the accessions. The level of morphological variation for the 40 traits estimated using the Shannon Weaver diversity index (H') ranged from 0.10 to 0.99, with an overall mean of 0.71 ±0.03, suggesting a highly diverse collection. Cluster analysis using the unweighted pair-group method using arithmetic averages grouped the 1256 accessions into 20 major clusters, with the number of accessions per cluster ranging from 15 to 166. The general leaf outline was highly correlated with leaf lobe type (r = 0.79) and leaf lobe number (r = 0.80) and were the predominant characters in grouping the accessions to clusters. No grouping of accessions based on region of origin was observed, suggesting movement of germplasm between regions. Approximately 70% of the accessions were morphologically distinct and a collection of 946 accessions was selected to represent Ugandan sweetpotato landrace diversity. The complete passport data for this collection is available at:
http://www.viazivitamu.org/ugasp_db/gis.htm

https://www.agronomy.org/publications/cs/abstracts/50/6/2364

COMMODITIES: ROOTS & TUBERS
The neogregarine protozoan Farinocystis sp. reduces longevity and fecundity in the West Indian sweet potato weevil, Euscepes postfasciatus (Fairmaire)

Norikuni Kumano, Noriko Iwata, Takashi Kuriwada, Keikon Shiromoto, Dai Haraguchi, Chisa Yasunaga-Aoki, Tsugu Kohama

2010. Journal of Invertebrate Pathology 105:298-304

Abstract. The number of West Indian sweet potato weevils, Euscepes postfasciatus, being mass-reared in a facility for use in sterile insect technique (SIT) eradication programs has undergone a drastic reduction. A neogregarine protozoan pathogen Farinocystis sp. (an undescribed species) was detected in vivo in the mass-reared E. postfasciatus. We investigated the effects of this disease on the longevity and fecundity of host weevils and the incubation time of the disease in the host body under mass-rearing conditions. Our results demonstrated that infection by this Farinocystis sp. decreased both longevity and fecundity in E. postfasciatus. In particular, the pathogen severely limited the production of progeny by infected females compared to healthy females. Therefore, we consider this protozoan infection to be the major cause of the decreased E. postfasciatus production in the mass-rearing facility.

Research highlights: ► Mass-rearing colony of Euscepes postfasciatus was damaged. ► Neogregarine protozoan pathogen was detected in the E. postfasciatus colony. ► Farinocystis sp. affects both longevity and fecundity of E. postfasciatus. ► This pathogen severely limited the production of progeny by infected females. ► Infection of Farinocystis sp. is the cause of the decreased E. postfasciatus colony.

Keywords: Sterile insect technique (SIT); Mass-rearing; Gregarinia; Imopoea

Journal of Invertebrate Pathology http://www.sciencedirect.com/science/journal/02612194

Effects of plant essential oils on immature and adult sweetpotato whitefly, Bemisia tabaci biotype B

Nian-Wan Yang, Ai-Lian Li, Fang-Hao Wan, Wan-Xue Liu, Dan Johnson

2010. Crop Protection 29: 1200-1207

Abstract. Effects of essential oils derived from garden thyme, Thymus vulgaris L., patchouli, Pogostemon cablin (Blanco) Benth., and lemon-scent gum, Corymbia citriodora (Hook.) K. D. Hill & L. A. S. Johnson, on mortality of eggs, first-instar nymphs, and pupae, and on adult oviposition, of Bemisia tabaci (Gennadius) biotype B were determined under laboratory conditions. Three concentrations of essential oils, 0.125%, 0.25% and 0.5% (v/v), were applied in contact toxicity experiments. In separate experiments, 0.5% essential oil treatment was tested for repellency. Greater mortality was observed with increasing dose of essential oils. No phytotoxicity was observed on plants treated with these essential oils. First-instar nymphs were more sensitive to essential oil treatments, compared with eggs and pupae. The greatest effect was found with essential oil extracted from T. vulgaris, which reduced the survival rate of B. tabaci by 73.4%, 79.0% and 58.2% after treatment of eggs, nymphs and pupae, respectively, as compared with controls. In no-choice tests, the cumulative survival rates of B. tabaci females treated with T. vulgaris, P. cablin and C. citriodora were 46.4%, 38.8% and 26.8% lower, respectively, as compared with controls. In choice tests, the mean numbers of eggs laid on P. cablin, T. vulgaris and C. citriodora oil-treated plants were 74.5%, 59.0% and 48.0% fewer, respectively, than on control plants. Based on this study, essential oil derived from T. vulgaris possessed the greatest contact toxicity, while P. cablin oil exerted the strongest repellency to B. tabaci. Hence, these two oils could be used as effective and environmentally sustainable bio-insecticides for the control of B. tabaci.

Keywords: Whitefly; Essential oil; Toxicity; Repellent activity; Botanical insecticide

Crop Protection http://www.sciencedirect.com/science/journal/00222011
The impact of Sweet Potato Leaf Beetle (*Typophorus nigritus viridicyaneus*; Coleoptera: Chrysomelidae) on sweet potato production
R. Hall-Hanson, Janet L. Lawrence and Desmond A. Jones (CARDI)

Abstract: Sweet potato (*Ipomoea batatas, L.*) is a major root crop within the region, providing a source of carbohydrate and an income for many rural families. With the current concern for food security within the region there has been an increase in the production of staple crops including sweet potatoes. Production is limited by pre and postharvest pests that significantly reduce yields. In recent years, the sweet potato leaf beetle, *Typophorus nigritus viridicyaneus* (Crotch) (Coleoptera: Chrysomelidae) has emerged as a major limiting pest reducing the quality of harvested yields by over 80%. Sweet potatoes are damaged when the immature beetles feed on the surface of the roots thus reducing their marketability. Identifying management practices to reduce beetle populations and crop damage is therefore critical for ensuring the production of high quality sweet potatoes and optimal returns to the producer. Replicated field trials were conducted in two major growing areas North West and West Central Jamaica to determine the impact of four insecticides; lambda cyhalothrin, imidacloprid, thiamethoxam, azadiractin and two popular export varieties on population levels and root damage. Populations averaged 2.36 (±0.54) beetles per plot during the growing season with levels being higher at root formation and enlargement than root initiation and the vegetative growth phase; mean numbers were 1.72 (±0.19) and 2.51(±0.43) respectively. Differences in beetle populations were observed between varieties and locations. Little differences were observed among the treatments with respect to the percentage clean roots as well as the severity of damage. These data are discussed within the context of developing an Integrated Pest Management strategy for the leaf beetle.

Keywords: Sweet potato, Sweet potato Leaf Beetle, *Typophorus nigritus viridicyaneus*; (Coleoptera: Chrysomelidae), Integrated Pest Management


**YAM:**

* Differential effect of hot water treatment on whole tubers versus cut setts of yam (*Dioscorea spp.*)
Coyne, D.L., Claudius-Cole, A.O., Kenyon, L., and Baimey, H.
2010. *PEST MANAGEMENT SCIENCE 66: 385-389*

Abstract: BACKGROUND: The use of thermotherapy or hot water treatment (HWT) is recommended for the management of plant-parasitic nematodes and other pathogens for a range of planting material, especially vegetatively propagated crops including yams, *Dioscorea* spp. The sprouting (germination) and consequent viability of yam following HWT, however, appear to be influenced by the post-treatment method of planting (whole or cut setts) and cultivar. The present study was established to evaluate the sensitivity of the most popular yam cultivars in Benin and Nigeria, West Africa, to HWT at 50–53 °C for 20 min.

RESULTS: Sprouting of both setts and whole tubers of most cultivars was affected by HWT. Across experiments, 47% of HWT material, compared with 61% of non-HWT material, sprouted over 8 weeks. When cut into setts, 41% of HWT or untreated tubers sprouted, compared with 72% of whole tubers. Whole, untreated tubers had highest sprouting rates (84%), and setts following HWT had the lowest (38%). Yam planting material was also not completely free of parasitic nematodes following HWT. The reaction to HWT or cutting was highly cultivar specific.

CONCLUSION: Yam cultivars vary in their sensitivity to hot water therapy. Care is therefore advised in selecting yam cultivars for HWT, especially when using cut setts.

**MAIZE:**

**Agronomy**

*Response of maize (Zea mays L.) to post-emergence applications of topramezone*

Thomas K. Gitsopoulos, Vasilios Melidis, Georgios Evgenidis
2010. *Crop Protection 29*: 1091-1093

Abstract: **Topramezone is a new herbicide for post-emergence control of broadleaf and grass weeds in maize.**

Two field experiments were conducted in northern Greece in 2008 and 2009 to determine the response of grain maize to topramezone applied with the adjuvant DASH at 2–4, 4–6 and 6–8 maize leaf stage. In both years, plant height, cob number and yield were not differently affected with the use of herbicide at these growth stages, indicating no difference in selectivity and a similar response of maize to the three post-emergence applications of topramezone. Slight injury symptoms of leaf bleaching were observed in the second year, however, they were transient with no lasting injury on maize growth.

Keywords: Topramezone; Tolerance; Herbicide selectivity; Field maize; *Zea mays*

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi/B6T5T-50KVMJG-1&_user=10&_coverDate=10%2F31%2F2010&_rdoc=5&_fmt=high&_orig=browse&_origin=browse&_zone=rslt_list_item&_srch=docinfo%23toc%235011%232010%23999709989%23232272737%23FLA%23display%23Volume)&_cdi=5011&_sort=d&_docanchor=&_ct=26&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4d10dcd4d76db19b4eb844143e26&searchtype=a


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*Integrated management of inorganic and organic fertilizers in maize cropping. Manejo integrado de fertilizantes y abonos orgánicos en el cultivo de maíz*

J. David Álvarez-Solís, D. Aurora Gómez-Velasco, N. Samuel León-Martínez, F. Antonio Gutiérrez-Miceli
2010. *AGROCIENCIA Volumen 44, Número 5. 1 de Julio - 15 de Agosto*

Abstract: Maintenance of the soil’s productive capacity requires integration of plant nutrition and soil improvement practices. It is thus necessary to apply agroecological practices and generate information about their effects on soil properties. The objective of this study was to evaluate the effect of integrated management of inorganic and organic fertilizers on phosphatase and urease activity, colonization of native mycorrhizal fungi and corn (*Zea mays L.*) yield. The experiment was conducted under rainfed conditions in Teopisca, state of Chiapas. The experimental design was complete randomized blocks with a factorial arrangement (2x4) of treatments: inorganic fertilizer levels (60-30 and 120-60 N-P) and organic fertilizer (none or control, compost, bokashi and worm humus; rate 6 t ha-1). In vegetative growth, alkaline phosphatase was 74.5 % higher with worm humus than the control without organic fertilizer, while acid phosphatase was 41.9 % higher with compost than the control. During flowering, urease activity decreased 46.2 % with the high dosage of fertilization. The percentage of mycorrhizal colonization was 1.3 times higher with bokashi than without organic fertilizer. Grain yield varied from 2152 to 3616 kg ha-1; the lowest value corresponded to the low dosage of inorganic fertilizer without organic fertilizer, while the highest values were obtained with the higher dosage of inorganic fertilizer with worm humus. With the low level of inorganic fertilizer, yield increased 3.8, 12.7 and 11.5 % with compost, bokashi and worm humus, while with the high level, the increase was 17.7, 21.9 and 30.5 %. The analysis of the results showing positive effects on enzymatic activity, mycorrhizal fungus colonization and corn yield suggest the importance of integrated management of inorganic and organic fertilizers in rainfed maize in the state of Chiapas.

Keywords: *Zea mays*, compost, phosphatase, mycorrhizae, local race maize, urease.

**PEANUT:**

*Drought stress: physiological basis for genotypic variation in tolerance to and recovery from pre-flowering drought in peanut*


**Abstract:** Drought during the pre-flowering stage can increase yield of peanut. There is limited information on genotypic variation for tolerance to and recovery from pre-flowering drought (PFD) and more importantly the physiological traits underlying genotypic variation. The objectives of this study were to determine the effects of moisture stress during the pre-flowering phase on pod yield and to understand some of the physiological responses underlying genotypic variation in response to and recovery from PFD. A glasshouse and field experiments were conducted at Khon Kaen University, Thailand. The glasshouse experiment was a randomized complete block design consisting of two watering regimes, i.e. fully-irrigated control and 1/3 available soil water from emergence to 40 days after emergence followed by adequate water supply, and 12 peanut genotypes. The field experiment was a split-plot design with two watering regimes as main-plots, and 12 peanut genotypes as sub-plots. Measurements of N$_2$ fixation, leaf area (LA) were made in both experiments. In addition, root growth was measured in the glasshouse experiment. Imposition of PFD followed by recovery resulted in an average increase in yield of 24% (range from 10% to 57%) and 12% (range from 2% to 51%) in the field and glasshouse experiments, respectively. Significant genotypic variation for N$_2$ fixation, LA and root growth was also observed after recovery. The study revealed that recovery growth following release of PFD had a stronger influence on final yield than tolerance to water deficits during the PFD. A combination of N$_2$ fixation, LA and root growth accounted for a major portion of the genotypic variation in yield ($r = 0.68$–0.93) suggesting that these traits could be used as selection criteria for identifying genotypes with rapid recovery from PFD. A combined analysis of glasshouse and field experiments showed that LA and N$_2$ fixation during the recovery had low genotype x environment interaction indicating potential for using these traits for selecting genotypes in peanut improvement programs.

**Keywords:** N$_2$ fixation; peanut; pre-flowering drought; recovery; root growth


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**SOYBEAN:**

**Establishing a soybean germplasm core collection**

Marcelo F. Oliveira, Randall L. Nelson, Isaias O. Geraldi, Cosme D. Cruz, José Francisco F. de Toledo


**Abstract:** Core collections are of strategic importance as they allow the use of a small part of a germplasm collection that is representative of the total collection. The objective of this study was to develop a soybean core collection of the USDA Soybean Germplasm Collection by comparing the results of random, proportional, logarithmic, multivariate proportional and multivariate logarithmic sampling strategies. All but the random sampling strategy used stratification of the entire collection based on passport data and maturity group classification. The multivariate proportional and multivariate logarithmic strategies made further use of qualitative and quantitative trait data to select diverse accessions within each stratum. The 18 quantitative trait data distribution parameters were calculated for each core and for the entire collection for pairwise comparison to validate the sampling strategies. All strategies were adequate for assembling a core collection. The random core collection best represented the entire collection in statistical terms. Proportional and logarithmic strategies did not maximize statistical representation but were better in selecting maximum variability. Multivariate proportional and multivariate logarithmic strategies produced the best core collections as measured by maximum variability conservation. The soybean core collection was established using the multivariate proportional selection strategy.

**Keywords:** Glycine max; Genetic diversity; Germplasm bank; Sampling strategies
Effect of integrated use of farmyard manure and chemical fertilizers on soil physical properties and productivity of soybean

2010. Soil and Tillage Research 110: 115-125

Abstract: The effect of sole application of inorganic fertilizers (NPK) (N:P:K:: 30:26:25 kg ha$^{-1}$) and combined application of farmyard manure (FYM) @ 4 Mg ha$^{-1}$ and inorganic fertilizers (NPK + FYM) vis-a-vis non-application of fertilizers and manures (control) on changes in soil physical properties and plant growth characteristics of soybean (cv. JS 335) was studied in a deep Vertisol at the Indian Institute of Soil Science, Bhopal during the year 2001-2004. The results indicated that conjunctive use of recommended dose of fertilizer and farmyard manure (NPK + FYM) resulted in significant ($P < 0.05$) decrease of bulk density (9.3%), soil penetration resistance (42.6%) and increase in hydraulic conductivity (95.8%) and mean weight diameter of the water stable aggregates (13.8%) and soil organic carbon content (45.2%) compared to control. Among the aggregates, in macroaggregate fraction (250–500 $\mu$m and 500–1000 $\mu$m size fraction) and in large macroaggregate fraction (>2000 $\mu$m) maximum soil organic carbon concentration was recorded under NPK + FYM. The root mass of soybean was mostly (98%) confined to 15 cm soil depth. Combined application of NPK and FYM recorded significantly higher ($P < 0.05$) root length density and root mass density of soybean in the 0–15 cm soil layer at flowering stage over NPK (28 and 65%) and control (63 and 175%). The root length density of soybean was significantly negatively correlated with the penetration resistance ($r = 0.98, P < 0.05$). Application of FYM @ 4 Mg ha$^{-1}$ with NPK significantly ($P < 0.05$) improved the biomass partitioning towards pod over NPK and control. The grain yield, water use efficiency and nitrogen use efficiency of soybean under NPK + FYM were significantly ($P < 0.05$) higher than NPK and control. The total above ground biomass and the leaf area index at R8 stage could account for respectively, 89 and 63% variation in grain yield of soybean. Therefore in every crop season, integrated use of farmyard manure at 4 Mg ha$^{-1}$ and recommended dose of chemical fertilizers may be practised in Vertisols for improving soil physical environment and achieving higher soybean productivity through efficient utilization of water and nutrients.

Growth and Yield Responses of Soybean to Row Spacing and Seeding Rate

William. J. Cox and Jerome H. Cherney

Abstract: Some growers in northern latitudes plant soybean [Glycine max (L.) Merr.] with a row crop planter in 0.38 m rows, but an economic analysis concluded that drilled soybean in rows <0.25 m was optimum in the North-Central United States. We planted two varieties in 0.19, 0.38, and 0.76 m rows at 321,000; 371,000; 420,000; and 469,000 seeds ha$^{-1}$ in New York in 2008 and 2009 to evaluate how soybean compensates to wide rows or low seeding rates in the Northeast United States. Soybean had limited compensation in biomass, pods, and seeds plant$^{-1}$ at wider rows so row spacing had linear responses for biomass accumulation (598, 554, and 497 g m$^{-2}$ in 0.19, 0.38, and 0.76 m rows, respectively) and leaf area index (LAI, 3.64, 3.47, and 3.16) at seed initiation; pod (1012, 935, and 875 pods m$^{-2}$) and seed density (2272, 2230, and 2072 seeds m$^{-2}$, respectively) at harvest; and yield (3.37, 3.12, and 2.98 t ha$^{-1}$) at harvest.

Field Crops Research: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TC6-50PJ1K-1&user=10&coverDate=08%2F05%2F2010&rdoc=1&fmt=high&origin=search&sort=d&docanchor=&view=c&acct=C0000502211_version=1&urlVersion=0&userid=10&md5=d12179e26df49d276bde574bb2c68dd

Soil and Tillage Research: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TC6-50PJJ1K-1&user=10&coverDate=12%2F31%2F2010&rdoc=1&fmt=high&origin=browse&zone=rslt_list_item&src=docinfo%23toc%235034%232010%23998809997%232447747%23FLA%23display%23Volume&cdi=5034&_sort=d&_docanchor=&ct=21&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=be9ece0ec555527547b346f9e6a8a&searchtype=a
2.86 Mg ha\(^{-1}\), respectively). Compensation in biomass, pods, and seeds plant\(^{-1}\) at lower seeding rates resulted in similar biomass accumulation (528–570 g m\(^{-2}\)), LAI (3.38–3.46), pod (921–965 pods m\(^{-2}\)), and seed densities (2132 to 2234 seeds m\(^{-2}\)) across seeding rates. Nevertheless, yield showed a quadratic response to seeding rate (3.04, 3.25, and 3.12 Mg ha\(^{-1}\) at 321,000; 420,000; and 469,000 seeds ha\(^{-1}\), respectively) with no row spacing interaction. Soybean compensated more at lower seeding rates than at wider rows, but field-scale studies are being conducted to evaluate the economics of both practices.

https://www.agronomy.org/publications/aj/abstracts/103/1/123

Pests & Diseases

Evidence of a susceptible allele inverting the dominance of rust resistance in soybean
Alexandre Garcia, Éberson Sanches Calvo, Romeu Afonso de Souza Kiihl and Eliezer Rodrigues de Souto

Abstract: Soybean rust (SBR) is the most threatening fungal disease in the major soybean [Glycine max (L.) Merr.] production areas around the world. In spite of the availability of chemical control with fungicides, the increase of production costs as well as operational difficulties associated with fungicide use for disease management has prompted the search for resistant genes in the soybean germplasm. Five genes (Rpp1, Rpp2, Rpp3, Rpp4, and Rpp5) have been reported as capable of conferring SBR resistance in soybean. Here we report the genetic segregation of the SBR resistance in two populations derived from crossing the SBR resistance source PI 594760B with the breeding lines TMG06_0012 (Population 1 [POP-1]) and TMG06_0011 (Population 2 [POP-2]). In both populations the resistance segregated as a single gene, but the resistance gene was dominant in POP-1 and recessive in POP-2. Molecular mapping of the phenotype placed it in the vicinity of the Rpp1 locus in both POP-1 and POP-2. When the breeding lines TMG06_0011 and TMG06_0012 where crossed with several other sources of resistance at the Rpp1, Rpp2, Rpp4, and Rpp5 loci or other putative loci, the inversion of gene action type observed with PI 594760B occurred only for the putative Rpp1 genotypes. We propose that a dominant susceptible allele, present in TMG06_0011, is causing the inversion of dominance observed in each of these crosses.

https://www.agronomy.org/publications/cs/abstracts/51/1/32
doi:10.2135/cropsci2010.01.0037

Germplasm / Breeding

Improvement of in vitro proliferation and elongation of Habanero pepper shoots (Capsicum chinense Jacq.) by temporary immersion
Bello-Bello, J.J., Canto-Flick, A., Balam-Uc, E., Gomez-Uc, E., Robert, M.L., Iglesias-Andreu, L.G., Santana-Buzzy, N.
2010. Hortscience 45:1093-1098

Abstract: This article describes the performance of nodal segments from Habanero pepper (Capsicum chinense) during shoot induction and elongation under different semisolid and liquid culture conditions with various degrees of ventilation in which they were exposed to different levels of immersion and growth regulators. The ethylene content in non-ventilated containers, the age of the explant donor plants as well as the effect of thidiazuron and paclobutrazol on shoot induction and of gibberelic acid and AgNO\(_3\) on shoot elongation were also evaluated. A temporary immersion bioreactor (BioMINT™) was used for the multiplication and elongation of isolated shoots with very good results. We report an efficient protocol for the in vitro propagation of Habanero pepper that produces plants with a high survival rate when transplanted to soil.

http://hortsci.ashspublications.org/cgi/content/abstract/45/7/1093
Agronomy

Graft compatibility of Scotch Bonnet (Capsicum chinense Jacq) with selected salt tolerant Solanaceous rootstocks
Lilieth Ives, Richard Brathwaite, Gregor Barclay, Clare Bowen-O’Connor, Wendy –Ann Isaac and Isaac Bekele.
Abstract: The history of grafting and its inherent benefit of salt-tolerance led to a study aimed at evaluating the graft compatibility between Scotch Bonnet and selected salt-tolerant solanaceous species. Seedlings of Scotch Bonnet were used as scion and rootstock (autograft) and non-grafted (control), while three salt-tolerant Solanum species Solanum melongena cv Black Beauty, Solanum lycopersicum cv Akash and Solanum nigrum common name bitter gumma were used as rootstocks. Grafted and non-grafted plants were grown for three weeks under greenhouse conditions. Graft compatibility was determined by the regeneration of vascular bundles across the graft interface and vegetative growth parameters. The results showed that the highest graft survival percentage (100%) was obtained in the Scotch Bonnet/Black Beauty heterografts and the lowest (16%) was obtained in the Scotch Bonnet/bitter gumma heterografts. Additionally, seedling growth was most vigorous in autografts compared with heterografts and non-grafted control plants. Histological analysis showed that graft union formation was slower in heterografts than in autografts. Vascular regeneration across the graft interface was seen in Scotch Bonnet autografts and heterografts with Black Beauty. However, the presence of necrotic tissue at the graft interface in heterografts on Akash and bitter gumma rootstocks both minimize and prevented vascular regeneration across the graft interface. Therefore, heterografts of Black Beauty and Scotch Bonnet exhibited graft compatibility, while Akash and bitter gumma rootstocks are graft incompatible with Scotch Bonnet scions. In conclusion, progressive scion growth and development and the regeneration of vascular bundles across the graft interface may be used to determine graft compatibility between C. chinense and selected solanaceous species. Additionally, this is the first report of grafting success between Scotch Bonnet and any Solanum species. This result, therefore, allows for a potentially wider adaptation of Scotch Bonnet to saline growing conditions.
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Growth, yield and water use efficiency response of greenhouse-grown hot pepper under Time-Space deficit irrigation
Shao Guang-Cheng, Liu Na, Zhang Zhan-Yu, Yu Shuang-En, Chen Chang-ren
2010. Scientia Horticulturae 126:172-179
Abstract: Greenhouse-grown hot pepper was used to investigate the effect of Time-Space deficit irrigation (TSDI), a newly developing irrigation technique based on regulated deficit irrigation (RDI) and partial rootzone drying (PRD), by measuring plant growth, yield and irrigation water use efficiency. The treatments consisted of factorial combinations of three factors, organized following an orthogonal L9 (3)4 test design with four growing stages. Three irrigation strategies (conventional furrow irrigation with full-water when soil water content was lower by 80% of field capacity (F), conventional furrow irrigation with 50% of full-water (D) and alternate furrow irrigation with 50% of full-water (P)) as the main plot factor were applied to select the optimum irrigation parameter at different stages of crop development, the treatment in which irrigation water was applied to both sides of root system when soil water content was lower by 80% of field capacity during all stages was considered as control (FFFF). Water consumption showed some significant effect of irrigation treatment during the growing period of different drought stress patterns application, and therefore decreased in these treatments to a level around 54.68–70.33% of FFFF. Total dry mass was reduced by 1.17–38.66% in TSDI treatments compared to FFFF. However, the
Cover cropping and novel pesticide usage in the management of pests of hot pepper (Capsicum chinense)

J. Karungi, P. Agamire, J. Kovach and S. Kyamanywa


Abstract: In a bid to develop technologies that serve grower needs for economic management of pests and diseases of hot pepper (scotch bonnet) while protecting public health and the environment, a study to assess the potential of cover cropping and/or less-risk pesticide usage in the management of pests and diseases of hot pepper was conducted for two consecutive seasons in Uganda. A split-plot randomized complete block design with three replications was used with cropping system (main plots) and pesticide treatment (sub-plots) as the factors. There were two cropping systems: the hot pepper+cowpea system vs. a hot pepper monocrop and five pesticide treatment options: (i) prophylactic treatment of plots at transplanting with granular carbofuran; (ii) weekly sprays of a neem-based formulation; (iii) combination of the prophylactic carbofuran treatment and neem; (iv) sulphur sprays at 10-day intervals (season 2 only); and (v) the untreated control. Data were collected on population dynamics of aphids, whiteflies, thrips, mites, nematodes and on plant performance parameters of branching and fruit weight. Results indicated that the hot pepper+cowpea system greatly lowered infestations of aphids and nematodes on hot pepper, but did not decrease thrips and whiteflies; and brought about a yield penalty on hot pepper. Prophylactic applications of carbofuran and/or sprays of a neem-based formulation lowered populations of aphids and whiteflies on hot pepper to varying extents; and increased yield of pepper.

http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=7801072
COMMODITIES: FRUITS & VEGETABLES

GENERAL:

Agronomy

Special issue on vegetable grafting
Giuseppe Colla [ed.]
2010. Scientia Horticulturae 127: 91-180
Partial content

Current status of vegetable grafting: Diffusion, grafting techniques, automation
Genetics, breeding and selection of rootstocks for Solanaceae and Cucurbitaceae
Physiological aspects of rootstock–scion interactions
Hormonal signaling in rootstock–scion interactions
Impact of grafting on product quality of fruit vegetables
Grafting fruiting vegetables to manage soilborne pathogens, foliar pathogens, arthropods and weeds

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235159%232010%23998729997%23232734745%23FLA%23&_cdi=5159&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=52ed8e76aaa8e4e9e1c6b4961294981

PINEAPPLE:

Growth indicators for different pineapple cultivars compared with the current standard ‘Smooth Cayenne’ in West Africa and Reunion Island: a first step toward modeling growth
Patrick Fournier, Cécile Dubois, Aurore Benneveau and Alain Soler

Abstract: European markets are segmented with several pineapple [Ananas comosus (L.) Merr.] cultivars, the ‘Smooth Cayenne’ (SC), the ‘MD-2’ hybrid, the new standard, ‘Queen’ and the ‘Flhoran 41’ (a red shell Cirad hybrid). Growth indicator standards are based on SC but growth characteristics may differ between cultivars. To determine if growth characteristics are comparable among pineapple cultivars, we analyzed the vegetative growths of SC, MD-2, Flhoran 41, and Queen Victoria in Ivory Coast and Reunion Island. First, the vegetative growths of plants produced from stem suckers were monitored using three indicators, the number of leaves, the D leaf weight and the plant weight. Then, the growths of plants produced from different types of planting material of Flhoran 41 were compared. Finally, the seasonal variations of Queen Victoria growth were analyzed to establish the basis of a heat unit model of growth for pineapple. All cultivars showed similar growth patterns but with some specificities. Plant weight increases were higher for MD-2 and Flhoran 41. At forcing, the D leaf weight was significantly lower in Flhoran 41 but the plants had a greater number of leaves resulting in similar plant weights. As already observed in SC, Flhoran 41 stem suckers grew faster than slips and crowns. Finally, the plant weight increase in Queen Victoria was highly correlated with the sum of temperatures. These observations allowed us to establish the basis of a heat unit model of pineapple growth based on sum of temperatures.

https://www.agronomy.org/publications/aj/abstracts/102/6/1572
doi:10.2134/agronj2010.0130
TOMATO:

**Effects of the plant growth regulator "Stimulate Tm" on some postharvest qualities of tomato grown in tropical greenhouse.**

Steen, S., Benkeblia, N. And Cohen, J.  
[http://www.actahort.org/books/877/877_31.htm](http://www.actahort.org/books/877/877_31.htm)

Abstract: This study investigated the effects of different concentrations of an exogenous plant growth regulator (Stimulate™, a commercial product consisting of a mixture of auxin, gibberellin and cytokinin), on some post harvest quality attributes of 'Albaron' tomato fruits, grown in greenhouses. Foliar applications of Stimulate™ were made every fourteen days. After harvesting, fresh and dry mass, diameter and colour per tomato fruit were assessed. The dry mass were 5.23, 5.68, 5.26 and 5.35 g/100 g fresh mass, the diameters were 6.06, 5.72, 6.35 and 6.24 cm, respectively for control (water) and increasing concentrations: 0.5, 1.0 and 2.0 µg/ml for each GA and IBA, with corresponding 0.9, 1.8 and 3.6 µg/ml of kinetin. No significant differences were observed. The rate of colour change from red orange to red was faster for the treated (7 days) compared to the control (9 days) plants. A positive correlation was observed for diameter and fruit mass. These results suggested that the exogenous application of the plant growth regulator Stimulate™ had no effect on the size of the fruits, but hastened colour changes.

Keywords: auxin, gibberellin, kinetin, fruit ripening, fruit mass, tropical greenhouse, *Lycopersicon esculentum*

Country: Jamaica

A new type of strain of *Xanthomonas euvesicatoria* causing bacterial spot of tomato and pepper in Grenada

2010. *Plant Disease* 94:1264

Full Text

Bacterial spot of tomato and pepper (BSTP) can be caused by several *Xanthomonas* genospecies (2). BSTP is a major disease in Grenada where A and B phenotypic groups (*Xanthomonas euvesicatoria* and *X. vesicatoria*, respectively, [2]) have been reported (3). There is no previous report of group A strains, which are strongly amylolytic and pectolytic, in Grenada. In March 2007, tomato and pepper leaves with lesions typical of BSTP were collected in Saint David and Saint Andrew parishes of Grenada. Bacterial isolations were performed on KC semiselective agar medium (4), resulting in isolation of five yellow-pigmented, *Xanthomonas*-like strains. Three strains isolated from tomato or pepper in Saint David were negative for starch hydrolysis and pectate degradation, two tests that were found useful for strain identification in the 1990s (2). Two strains isolated from pepper in Saint David were strongly amylolytic and degraded pectate. Amplified fragment length polymorphism (AFLP) and multilocus sequence analysis (MLSA) assays targeting *atpD*, *dnaK*, *efp*, and *gyrB* were performed on the five strains from Grenada together with a type strain of each of *X. euvesicatoria*, *X. perforans*, *X. gardneri*, and *X. vesicatoria* as well as other reference strains of *X. euvesicatoria* and *X. perforans* as described previously (1). All strains from Grenada were identified as *X. euvesicatoria* regardless of the typing technique. On the basis of AFLP assays, the two strains with phenotypic features not reported in Grenada were closely related (distances of ≤0.002 nucleotide substitutions per site [1]) to a group of strains from India (ICMP 3381, LMG 907, LMG 908, and LMG 918). These two strains were also identical to the Indian strains based on MLSA, but differed from the *X. euvesicatoria* type strain by at least one nucleotide substitution in all loci examined. The three strains from Grenada that were negative for starch hydrolysis and pectate degradation had sequences identical to that of the type strain. Young leaves of tomato plants of cv. Marmande and pepper plants of cvs. Yolo Wonder and Aiguille were infiltrated (six inoculation sites per leaf, three replicate plants per cultivar per experiment, and the experiment was replicated once) using inoculum of each of the five strains from Grenada made from suspensions in Tris buffer containing approximately 1 × 10^5 CFU/ml. Two reference strains of *X. euvesicatoria* (NCPPB 2968 and LMG 922) were also inoculated as positive control treatments. Negative control treatments consisted of leaves infiltrated with sterile Tris buffer. Typical water-soaked lesions that developed into necrotic spots were observed 3 to 8 days after inoculation (dai) for all strains on all cultivars, except NCPPB 2968, which was not pathogenic on pepper cv. Aiguille.
Xanthomonas population sizes from lesions plated onto KC agar medium (4) 25 dai ranged from $3 \times 10^6$ to $5 \times 10^7$, $8 \times 10^7$ to $2 \times 10^8$, and $9 \times 10^6$ to $2 \times 10^8$ CFU/lesion on tomato cv. Marmande and pepper cvs. Yolo Wonder and Aiguille, respectively. The epidemiological importance of this previously unreported group of *X. euvesicatoria* strains in Grenada needs to be assessed.


**Safer tomato production techniques: a field guide for soil fertility and pest management**
Srinivasan, R. [ed.]
2010. Shanhua, Tainan : AVRDC - The World Vegetable Center
(AVRDC Publication No. 10-740). vii, 97 pp
Contact: AVRDC – The World Vegetable Center Library P.O. Box 42, Shanhua, Tainan, Taiwan 74199, R.O.C.
E-mail: fang-chin.chen@worldveg.org. Publications webpage http://www.avrdc.org/index.php?id=28
AVRDC – The World Vegetable Center http://www.avrdc.org/index.php?id=1

**WATERMELON:**

**Watermelon production guide**
Content: Soil; Crop establishment; Irrigation; Fertilizer requirements; Weed control; Pests and diseases
Country: Trinidad and Tobago

**Characterisation and functional properties of watermelon (Citrullus lanatus) seed proteins**
Ali Abas Wani², Dalbir Singh Sogi¹, Preeti Singh, Idrees Ahmed Wani², Uma S Shivhare
2011. Journal of the Science of Food and Agriculture 91:113-121
Abstract. BACKGROUND: People in developing countries depend largely on non-conventional protein sources to augment the availability of proteins in their diets. Watermelon seed meal is reported to contain an adequate amount of nutritional proteins that could be extracted for use as nutritional ingredients in food products.
RESULTS: Osborne classification showed that globulin was the major protein ($\geq 500 \text{ g kg}^{-1}$) present in watermelon seed meal, followed by albumin and glutelin. Sodium dodecyl sulfate polyacrylamide gel electrophoresis indicated that the polypeptides had low molecular weights ranging from 35 to 47 kDa. Isoelectric focusing revealed that the isoelectric point of most proteins was in the acidic range 4–6. These proteins are rich in aspartic acid, glutamic acid and serine. An increase in pH (5–9) significantly ($P < 0.05$) decreased the denaturation enthalpy of these proteins. Among functional properties, albumin exhibited a much higher dispersibility index ($810.3-869.6 \text{ g kg}^{-1}$) than globulin ($227.8-245.4 \text{ g kg}^{-1}$), glutelin ($182.1-187.7 \text{ g kg}^{-1}$) and prolamin ($162.3-177.7 \text{ g kg}^{-1}$). Digestibility was in the ranges 760.6–910.0 and 765.5–888.5 g kg$^{-1}$ for Mateera and Sugar Baby watermelon protein fractions respectively, while surface hydrophobicity ranged from 126.4 to 173.2 and from 125.8 to 169.3 respectively. The foaming and emulsifying properties of albumin were better than those of the other proteins studied.
CONCLUSION: The good nutritional and functional properties of watermelon seed meal proteins suggest their potential use in food formulations.
Keywords: watermelon seed protein; thermal properties; protein digestibility; amino acid analysis
The water relations and irrigation requirements of coconut (Cocos nucifera): a review
M. K. V. Carr
2011. Experimental Agriculture 47: 27-51

Abstract: The results of research on the water relations and irrigation needs of coconut are collated and summarized in an attempt to link fundamental studies on crop physiology to drought mitigation and irrigation practices. Background information on the centres of origin and production of coconut and on crop development processes is followed by reviews of plant water relations, crop water use and water productivity, including drought mitigation. The majority of the recent research published in the international literature has been conducted in Brazil, Kerala (South India) and Sri Lanka, and by CIRAD (France) in association with local research organizations in a number of countries, including the Ivory Coast. The unique vegetative structure of the palm (stem and leaves) together with the long interval between flower initiation and the harvesting of the mature fruit (44 months) mean that causal links between environmental factors (especially water) are difficult to establish. The stomata play an important role in controlling water loss, whilst the leaf water potential is a sensitive indicator of plant water status. Both stomatal conductance and leaf water potential are negatively correlated with the saturation deficit of the air. Although roots extend to depths >2 m and laterally >3 m, the density of roots is greatest in the top 0–1.0 m soil, and laterally within 1.0–1.5 m of the trunk. In general, dwarf cultivars are more susceptible to drought than tall ones. Methods of screening for drought tolerance based on physiological traits have been proposed. The best estimates of the actual water use (ETc) of mature palms indicate representative rates of about 3 mm d\(^{-1}\). Reported values for the crop coefficient (Kc) are variable but suggest that 0.7 is a reasonable estimate. Although the sensitivity of coconut to drought is well recognized, there is a limited amount of reliable data on actual yield responses to irrigation although annual yield increases (50%) of 20–40 nuts palm\(^{-1}\) (4–12 kg copra, cultivar dependent) have been reported. These are only realized in the third and subsequent years after the introduction of irrigation applied at a rate equivalent to about 2 mm d\(^{-1}\) (or 100 l palm\(^{-1}\) d\(^{-1}\)) at intervals of up to one week. Irrigation increases female flower production and reduces premature nut fall. Basin irrigation, micro-sprinklers and drip irrigation are all suitable methods of applying water. Recommended methods of drought mitigation include the burial of husks in trenches adjacent to the plant, mulching and the application of common salt (chloride ions). An international approach to addressing the need for more information on water productivity is recommended.

http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=7986452&fulltextType=RA&fileId=S0014479710000931

Seroepidemiology of leptospirosis in livestock in Trinidad
Sharianne M. Suepaul, Christine V. Carrington, Mervyn Campbell, Gustave Borde and Abiodun Adewale Adeplesiyun

Abstract: A study was conducted to determine the seroprevalence of leptospirosis and infecting serovars across livestock (cattle, sheep, goats, and pigs) in Trinidad using the microscopic agglutination test with an international panel of 23 serovars. Of a total of 590 cattle tested, 21.5% were seropositive with agglutinations to 13 of the 23 antigens used in the panel. Icterohaemorrhagiae (9.3%), Sejroe (4.1%), Ballum (4.1%), and Autumnalis (1.9%) were the predominant serogroups detected in the cattle sampled (n = 590). Of 222 sheep tested, 5.0% were seropositive for five serovars belonging to two serogroups. These serogroups were Autumnalis at 2.7%, and Icterohaemorrhagiae at 2.3% of all sheep tested (n = 222). Of a total of 180 goats tested, 3.3% were seropositive, all agglutinating to the Icterohaemorrhagiae serogroup, 1.7% to serovar Copenhageni, 1.1% to serovar Mankarso, and 0.6% to serovar Icterohaemorrhagiae. Among pigs (n = 200), 5.0% were seropositive for five serovars belonging to three serogroups. These serogroups were Icterohaemorrhagiae at 2.5%, Australis at 2%, and Ballum at 0.5%. Overall, age and sex of animals were not significantly associated with leptospirosis with the exception of cattle.
where age was a significant factor for seropositivity. It was concluded that for livestock, leptospirosis may be an important zoonotic and economic disease, particularly in the case of cattle. It is imperative that the impact of leptospirosis on abortion, stillbirths, and decreased milk production in livestock in the country be assessed.

Keywords: Livestock – Leptospira – Seroprevalence – Microscopic agglutination test

http://www.springerlink.com/content/4v144n533077kr31/

SMALL RUMINANTS:

Production

Production systems of Creole goat and their implications for a breeding programme
M. Gunia and N. Mandonnet and R. Arquet and C. de la Chevrotière and M. Naves and M. Mahieu and G. Alexandre


Abstract: The Creole goat is a local meat breed well adapted to the tropical environment of Guadeloupe, a French island in the Caribbean. A survey of 47 goat farmers was conducted in May 2008 to describe the Guadeloupean goat farming systems. It was the preliminary step for the implementation of a breeding programme for Creole goats. Farmers had 31 does on average. A small number (4%) kept only Creole goats. Most of them (62%) had a mixed herd of Creole and crossbreds. One-third of them (34%) reared only crossbred goats. Farmers appreciate the rusticity and resistance of the Creole goat but consider its growth as too slow. The most desired traits for goat selection were conformation and growth for males (77% of the answers). These traits were also important for females (30% of the answers). Maternal qualities were also frequently cited (maternal behaviour 23%, reproduction 20% and milk production 17%). Disease resistance was not seen as an important trait (10% and 7% of the answers for bucks and does, respectively). A typology constituted of five groups of farmers was also created. Farmers of three groups were retained to participate in a selection programme. They kept Creole goats and have expressed a strong willingness to join a selection programme. The results of the survey suggest that a breeding programme should mostly focus on the Creole goat as a maternal breed. Real consideration should be given to disease resistance. The Creole goat has indeed a key role to play in the sustainability of local farming systems.

http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=7917144&fulltextType=RA&fileId=S1751731110001412

Breeding

Characteristics and production performance of Tianfu goat, a new breed population
D.H. Wang, G.Y. Xu, D.J. Wu, Z.H. Liu

2011. Small Ruminant Research 95(2-3): 88-91

Abstract: Characteristics and performance of Tianfu goat, a new meat goat population resulting from Chengdu Ma goats crossbred with Saanen, Toggenburg, Nubian and Boer goats, were revealed in the study. The results showed that this population has a physique good for mutton production. The average body weights (BW) at 6 months and adult were 29 kg and 77 kg for males, 26 kg and 54 kg respectively for females. Pre-weaning average daily gain (ADG0-60) and post-weaning average daily gain (ADG60-180) were 173 g/d and 127 g/d for males, 146 g/d and 119 g/d for females. The growth inflection points of age and BW were 5 months and 24 kg for males, 4 months and 19 kg for females. The average live weight, dressed weight and dressing percentage of castrated males slaughtered at 6 months and 12 months were 27 kg, 14 kg, 50% and 41 kg, 21 kg, 52% respectively. By crossbreeding with Tianfu goats, performance of indigenous goats was improved by 24–51%. Comparative study showed the breed has excellent production performance with magnificent prospect for promotion of the mutton supply in China.

Keywords: Tianfu goat; New population; Characteristics; Production performance

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%23235161%23232011%2323999049997%23232880762%23FLA%23&_edi=5161&_pubType=&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_user=10&md5=5f8da713399191a2359c3495e08afdf
Definition of breeding objectives and optimum crossbreeding levels for goats in the smallholder production systems

Abstract: The objective of this study was to define breeding objectives and consequently determine optimum crossbreeding levels for goats in the smallholder production systems. Profits and economic values (EVs) were estimated for four genotypes namely (a) original stock or local goat breeds with 0% German Alpine blood level (OS), (b) F1 with 50% German Alpine blood level (F1), (c) first backcross with 75% German Alpine blood level (B1) and (d) second backcross with 87.5% German Alpine blood level (B2). The EVs were estimated for average daily milk yield (DMY, kg), average post-weaning daily gain (ADG, kg), number of kids weaned (NKW), mature weight (MW, kg) and 12-month live weight (LW, kg). Profitability in Kenyan Shilling (KES) without risk was optimal (KES 6038.02) for the B1 genotype. Economic values without risk for most traits were highest for the F1 genotype, i.e., KES 64.85 (ADG), 24.02 (NKW), −27.55 (MW) and 84.51 (LW). There was, however, a 23% reduction in profits in the F1 genotype. It was evident that crossbreeding would improve the profitability of the smallholder farms, but not beyond the 75% grade level. A similar trend was observed when risk was incorporated. Differences in profitability with and without risk were less than 0.005% for all the genotypes. However, differences in EVs were large, ranging from −28% to +19%; DMY had the largest differences. Therefore, incorporation of risk in estimation of EVs for traits of importance is necessary. This study has also demonstrated that crossbreeding to a higher grade level is not necessarily compensated for by a high performance in most traits. Therefore, a crossbreeding program targeting B1 (75%) crossbreds would be desirable for implementation in the smallholder production systems.

Keywords: Breeding objectives; Crossbreeding; Economic values; Goats; Risk

Practical crossbreeding for improved livelihoods in developing countries: The FARM Africa goat project

Abstract: Successful livestock improvement programmes focusing on low-input smallholder production systems though rare, are possible using community-based approaches. This paper outlines important design and implementation components of a goat improvement programme undertaken by FARM Africa in the eastern highlands of Kenya. Through strong capacity building initiatives at grass-roots level, producers were empowered to undertake a goat genetic improvement programme that benefitted them in several ways. This resulted in the farmers forming their own umbrella organizations to cater for their interests as producers in accessing animal health and breeding services, production inputs, and marketing goats and goat products. In seven years, the population of improved goats in one of the project areas increased from 2100 to 5500, and the livelihoods of the participating farmers improved. Income from sales of milk and improved breeding and slaughter stock increased, while food security improved as a result of daily milk consumption and improved crop yields resulting from use of the rich goat manure. The project has, however, faced challenges arising mainly from the popularity of the improved goats within the Eastern Africa region, which has resulted in sale of a large number of the young animals, leaving few replacements within the project area. Uptake of goat breeding by private commercial farmers to provide breeding stock and replacement animals is currently lacking. Further research and evaluation is required on how to strengthen collective-action based institutions to improve services within smallholder farmer communities.

Keywords: Community-based; Goat improvement; Smallholder systems
Nutrition

An assessment of the seasonal variability in forage and milk quality parameters on dairy farms in a medium to low rainfall area
P Francis (CARDI) and T. Velloza

Abstract: Fluctuations in milk solids on many dairies in Barbados required a study on the interaction of season, forage and milk quality. Analyses in 2009 included 93% of hay samples <5% CP, 44-53% ADF and 64-77% NDF. Grass, sorghum and maize silages were generally of better quality with an average 7.5 CP %, 65% and 45% NDF and ADF respectively. The % CP of pastures ranged from 3-13% while the NDF and ADF averaged 70 and 50% respectively.

Cows produced an average of 25kg milk/day and milk volume during the dry period was unaffected. However, weekly assessment of % total milk solids, fat and solid non fat milk in 2008 and 2009 indicate that quality was affected on several farms. Data analyses indicate that fat was significantly low during the first quarter of 2008 (P< 0.05). Seventeen % of dairies experienced low SNF and fat depression throughout that year. In 2009, 58% of dairies experienced either low SNF or fat depression during the 1st quarter. Dairies in areas receiving <800 mm of rain in 2009 were primarily affected. Dairies with inadequate pasturelands and which purchased hay were more affected than those using silage. Strategies to mitigate those problems in the dry season are proposed.

Keywords: Forage, milk quality, SNF, fat depression

Effects of defaunation on digestion of fresh Digitaria decumbens grass and growth of lambs
M. Eugène and D. Sauvant and J. L. Weisbecker and H. Archimède

Abstract: The effects of defaunation on growth and digestion were measured in sheep fed fresh Digitaria decumbens grass cut at four stages of regrowth 14, 28, 42, and 56 days, and with different protein to energy (P/E) ratios. Two completely randomized designs trials (growth and digestion) were conducted using faunated animals, defaunated rams and protozoa free lambs. The digestion trial: eight faunated and eight defaunated rams fitted with ruminal and duodenal cannulas were fed 4 diets (diets D1 to D4) to measure digestion parameters. The dietary P/E ratios were 120 (D1), 130 (D2), 130 (D3), and 140 (D4) g PDIN/UFL (Protein Digested in the small Intestine supplied by microbial protein from rumen-degraded protein/Feed Unit for Lactation) and the grass stages of regrowth were 56, 42, 28, and 14 days, respectively. Increasing the dietary P/E ratios increased dry matter intake (DMI) and the total tract digestibility of organic matter (OM), NDF and CP. Defaunation decreased DMI, except for rams fed D4 diet. Defaunation also decreased total tract digestibility of OM except for rams fed D1 diet and that of NDF except for rams fed D1 and D4 diets. Increasing the dietary P/E ratios also increased nitrogen intake and ammonia (NH₃) concentration in the rumen, whereas defaunation decreased them. The dietary P/E ratio increased non-NH₃ nitrogen and microbial nitrogen duodenal flows and microbial efficiency. Defaunation did not affect duodenal flows of neither non-NH₃ nitrogen and microbial nitrogen or microbial efficiency. The growth trial: 20 faunated and 20 protozoa free lambs were fed four diets (diets D5 to D8) to measure their average daily gain (ADG). The dietary P/E ratios were 60 (D5), 70 (D6), 80 (D7) and 100 (D8) g PDIN/UFL and the stages of regrowth were 56, 42, 28, and 14 days, respectively. DMI of lambs increased with P/E ratio. Protozoa free lambs had greater DMI than faunated ones.
Effects of different levels of coconut oil supplementation on performance, digestibility, rumen fermentation and carcass traits of Malpura lambs

R.S. Bhatt, N.M. Soren, M.K. Tripathi, S.A. Karim


Abstract: The influence of coconut oil (CO) supplementation (0, 25, 50 and 75 g/kg of concentrate) upon performance, nutrient utilization, rumen fermentation, blood biochemistry and carcass characteristics were assessed in lambs (4 males and 4 females in each treatment) between 15 d of age and 6 months. Lambs were allowed to suckle twice daily until 90 d of age. Concentrate and forage (Ailanthus excelsa leaves) were provided ad libitum for the duration of the experiment. Lambs were weighed at weekly intervals, and a metabolism study was conducted on six representative lambs from each group at 120 d of age to determine nutrient utilization and N balance. Blood samples and rumen liquor samples were drawn at 180 d to determine blood biochemical and rumen fermentation characteristics. At 6 months of age all the male lambs were slaughtered and carcass traits were evaluated. Coconut oil intake was 7.1, 13.8 and 18.8 g/d in three treatment groups compared to zero in control. Pre- and post-weaning gain was similar while dry matter intake was higher in both pre-weaning (L: P<0.001; Q: P<0.001) and post-weaning (L: P=0.001; Q: P=0.001) in control. Digestibilities of organic matter (P=0.013) and neutral detergent fiber (P=0.062) decreased and that of ether extract increased (P=0.001) linearly with increased CO supplementation. The N retention decreased linearly (P=0.001) with increasing CO supplementation. Concentration of total N and trichloroacetic acid precipitable N decreased at a decreasing rate (Q: P=0.051 and P=0.019, respectively) whereas ammonia N in rumen liquor decreased at an increasing rate (Q: P=0.003) with increased CO supplementation. Coconut oil supplementation linearly (P=0.006) reduced rumen protozoa population. Though the concentration of serum glucose was similar, serum cholesterol and non-esterified fatty acids increased linearly (P<0.05) with CO supplementation both pre- and post-weaning. Pre-slaughter weight, dressed weight, eye muscle area, and body fat were similar in all the lambs. Coconut oil supplementation up to 50 g/kg is optimum in lamb rations due to improved feed conversion ratio and production of a carcass with acceptable characteristics. Higher levels of CO supplementation depressed growth and feed conversion due to its suppression of rumen protozoa and reduced fiber digestibility.

Keywords: Lambs; Coconut oil supplementation; Growth; Rumen fermentation; Blood parameters; Carcass characteristics

doi:10.1016/j.anifeedsci.2010.11.021

Animal Feed Science and Technology http://www.sciencedirect.com/science/journal/03778401

Growth performance, carcass characteristics and meat sensory evaluation of West African dwarf sheep fed varying levels of maize and cassava hay


Abstract: A study was conducted to determine the growth performance and meat yield and quality of West African dwarf sheep. Twenty rams weighing an average of 15.3 ± 0.79 kg live weight and with an average age of 18 months were allotted at random to five dietary treatments of 0%, 25%, 50%, 75% and 100% maize hay (MH) for a period of 105 days. Dry matter (DM) intake and growth rate of the rams were improved as the level of cassava hay (CH) increased in the diets. Live weight gain varied significantly (P<0.05) across the treatments, ranging from 38.8 to 47.9 g/day. The carcass weight of the rams fed 100% MH was significantly (P<0.05) lower compared with the other treatments. Dressing percentage ranged from 56.5% to 61.0% with no significant (P>0.05) difference...
observed across the treatments, while the distribution of the slaughtered parts was similar \( (P > 0.05) \) regardless of the dietary treatment. Proximate composition of the meat from the loin indicated that the DM, crude protein, fat and ash contents were not influenced \( (P > 0.05) \) by the dietary treatments. Panellists rated the meat to be similar \( (P > 0.05) \) in flavour, juiciness, tenderness and overall acceptability while colour and texture varied significantly \( (P < 0.05) \) across the treatments. In conclusion, this study indicated that better growth performance and meat production in West African dwarf sheep can be improved in form of body weight and carcass production when fed 25%MH and 75% CH diet.

Keywords: Dwarf sheep – Growth – Hay – Carcass characteristics

http://www.springerlink.com/content/p758640p4645686u/

RABBITS:

Growth, feed conversion and carcass traits study in rabbits, Trinidad, West Indies
Ansari F. Hosein (CARDI) and Rajendra K Rastogi (UWI)
2010. CARDI Review April (issue 9):14-21

Abstract: A total of 71 New Zealand White rabbits of both sexes were reared from birth to slaughter ages of 12 \( (n=24) \), 14 \( (n=24) \) and 16 \( (n=23) \) weeks. After weaning at four weeks of age, weaners were housed in individual cages and fed a 50/50 mixture of chicken broiler finisher (min. 18.5 % crude protein) and pig grower (min. 16 % crude protein) pellets. Available type of grass and dried whole coconut fibre were provided \textit{ad libitum}. During the fattening period, each rabbit was weighed on a weekly basis before feeding. Rabbits were fasted for 24 hours before slaughter. Post-weaning ADG for rabbits grown to 12, 14 and 16 weeks was 24.6, 22.8, and 25.4 g, respectively. There was no significant effect \( (P>0.05) \) of the length of growing period on ADG. However, average daily feed intake and the feed conversion ratio (FCR) significantly \( (P<0.001) \) increased as the slaughter age increased from 12-16 weeks. FCR was 2.03, 2.35 and 2.77 at 12, 14 and 16 weeks respectively. Every carcass trait measured was found to have significantly \( (P<0.001) \) increased between 12 and 16 weeks old with the exception of the kidney fat and gall bladder, which showed no significant \( (P>0.05) \) variation. Fat deposition seems to have shifted from the kidneys to the pelvic area after the 14th week of life. The average dressing percentage was 51.1, 51.2 and 53.2\% for rabbits slaughtered at 12, 14 and 16 weeks, respectively. The increase in live weight between 12 and 16 weeks was 51.7\%. The increases in the weights of kidney (35.9\%), gastrointestinal tract (30.2\%) and distal part of the four feet (31.1\%) were lower than increases in the weights of the skin (85.8\%), hind legs (57.3\%), liver (56.9\%), pelvic fat (152.7\%), kidney fat (75.9\%) and reproductive tract (160.8\%). Considering only the cost of feed pellets for the doe during gestation and lactation plus that for the fattener, the cost of producing 1 kg edible carcass, inclusive of the kidneys, heart, liver and lungs, was found to be the lowest (TT$8.88) at 14 weeks old compared to rabbits slaughtered at 12 (TT$8.99) or 16 (TT$9.85) weeks old. The income above the feed pellet cost was calculated to be TT$19.90, TT$20.01 and TT$19.04 for rabbits grown to 12, 14 and 16 weeks of age, respectively. Based on the cost of production and good carcass composition, it was concluded that rabbits should be slaughtered at 14 weeks (2.1 kg live weight) of age.

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An overview of Caribbean fisheries
Hugh A. Saul, Caribbean Regional Fisheries Mechanism (CRFM) Secretariat
2010. CARDI Review September (issue 10): 3-11

Abstract: CARICOM Member States and Associate Members occupy a total land area of 436,704km² whereas the total area of the maritime waters under their jurisdiction is 2,041,708km². This means that more than 82% of the area under jurisdiction is maritime space, which includes both the seabed and water column with their different ecosystems, living and nonliving resources (CRFM 2003).

Fisheries in Member States of the Caribbean Community is strategically very important for sustained economic opportunities and social soundness particularly within rural communities and among the poor. Further, it shapes the culture of our people, and makes an important contribution to development and the attainment of food and nutrition security in the region. It is a prime source of animal protein for the population, with per capita consumption of fish in the region at between 23 kg and 25 kg per year, which is well above the world average (16.4 kg in 2005).

The sub-sector provides direct employment for more than 120,000 fishers and indirect employment opportunities for thousands of others (particularly women) in the processing, marketing, boat building, net making and other support services (CRFM 2005).

Annual nominal production of fish in the Caribbean ACP States has been growing steadily since the 1950s reaching about 195,000 tonnes valued at about US$600 million in 2000.

The existing global economic stress coupled with the loss of preferential treatment for traditional crops such as sugar and bananas are taking their toll on CARICOM countries. Although fisheries may not be the answer to all our economic woes, it could become one of the answers. Fisheries account for up to 7% of some Member States’ GDP.

The true contribution is however, much higher since the processing and distribution aspects of the industry are not included in the fisheries sub-sector GDP. Fish processing, for example, is computed in the manufacturing and processing sector. Furthermore, these figures do not include the contribution of the recreational fishery, which is a rapidly growing sub-sector closely linked to tourism. The Bahamas estimate that recreational fisheries generate more than US$100 million in revenue each year.


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PROTECTED AGRICULTURE:

Protected Agriculture in Belize
H. Reyes (CARDI)

Abstract: The traditional vegetables grown in Belize are becoming more difficult to manage because of the major pests that are becoming more resistant to chemicals. The ministry of Agriculture and Fisheries (MAF) is seeking alternative solutions to this problem that is becoming a threat to our agriculture. Therefore one of the alternatives is Protected Agriculture.
Protected Agriculture in Belize is a promising technology to extend the calendars of harvesting traditional vegetables and also to assure the provision of fresh products to hotels and local market when the offer from open fields results in extreme limitation.

Not much is known about this technology by farmers in the country, but the ministry has trained extension officers to provide farmers with the basic help to be successful in this new technology. Further work is required to be done in this new field due to the economic importance and potential threat to the traditional vegetables in Belize. Our goal would be to develop a comprehensive and effective technological package programme for protected agriculture in Belize.


Protected Agriculture in the CARICOM region: the current and future role of CARDI
J. Lawrence, Dionne O. Clarke Harris, Ronald Pilgrim (CARDI)

Abstract: With the recent thrust within the CARICOM Region to increase food production and productivity to satisfy local demand, technologies such as protected agriculture which have the potential to boost yields and provide high economic returns even at small scales are being embraced. Despite the demonstrated economic, social and environmental benefits of protected agriculture in the Region, many producers have been unable to sustain and/or optimize yields and maintain profitable enterprises. These observations are largely rooted in the use of inappropriate structures for the climatic conditions of the Region, pest outbreaks, the inadequate knowledge and skill of producers and limited industry support systems and services. The need for research and development interventions have therefore become increasingly necessary for alleviating these constraints and ensuring the establishment of a competitive and sustainable protected agriculture industry. Towards this goal, CARDI’s research efforts seek to improve yield (quantity and quality) and the profitability of production systems through the generation, validation and demonstration of appropriate technologies. Specific areas of focus include economics of producing vegetables under various protected structures versus open field systems, low input protected systems, ventilation systems for optimizing the growing environment, growing media, market acceptable heat and pest tolerant crop varieties, fertility management regimes and IPM systems for major pests. With the recognition, that the creation of new and innovative technologies is only one aspect of developing a sustainable industry, the institute along with key partners has also sought to support industry development through the provision of appropriate infrastructure and capacity building in the areas of production and marketing systems. Such interventions are discussed in relation to improving the contribution of protected agriculture to food and nutrition security, improving cross-sectoral linkages and enhancing livelihoods along the value chain.

Keywords: food and nutritional security, protected agriculture, research and development, vegetable production systems
http://www.cedaf.org.do/eventos/cfcs_2010/index_e.php Once downloaded, scroll up the page to get PDF toolbar and navigate
http://www.cedaf.org.do/eventos/cfcs_2010/index_e.php

A new alternative: protected agriculture. [Format - DVD]
2010. CARDI/UWI/CTA
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868- 645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org

SEE ALSO Climate Change section
Manual of soil conservation and slope cultivation
Simpson, L.A. (CARDI)
Caribbean Agricultural Research and Development Institute, (Belize).
Prepared by CARDI for UNDP; Government of Belize; Global Environment Facility; Ministry of Natural Resources and Environment, Forestry Division.
Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868- 645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org

THEMATIC AREAS: SOIL & WATER MANAGEMENT

THEMATIC AREAS: NATURAL RESOURCE MANAGEMENT

CLIMATE CHANGE:

CTA/CARDI Climate change and Agriculture in the Caribbean: Protected Agriculture - An adaptation option Workshop, 17-19 October 2010, Grenada National Stadium as part of the Caribbean Week of Agriculture (CWA) in Grenada.

- Climate change and agriculture in the Caribbean: protected agriculture - an adaptation option workshop brief

- Climate change and agriculture in the Caribbean: protected agriculture - an adaptation option. workshop brief. Document developed by Climate Change workshop participants: Jose Fonseca, Leslie Simpson, Paulette Bynoe, Jervis Rowe, Rhea Nelson, Janet Lawrence, October 20th, 2010. (Presented to the Alliance, Caribbean Week of Agriculture, Grenada, October 21st, 2010)

- Protected Agriculture in the CARICOM Region: a possible climate change adaptation option for ensuring food and nutrition security by Dr Janet L. Lawrence

- Regional strategy for agriculture in relation to climate change in the Caribbean by Dr Leslie Simpson

Available at Caribbean Agricultural Research and Development Institute, P.O. Bag 212, Frederick Hardy Building, University of the West Indies, St. Augustine Campus, St Augustine, Trinidad and Tobago W.I.
Tel: 1-868- 645-1205-7. Fax: 1-868-645-1208. Email: infocentre@cardi.org
Climate change and agriculture in the Caribbean: approaches and opportunities for sustainable development in the 21st Century
Leslie Anthony Simpson (CARDI, Jamaica)

Abstract: There is enough evidence to conclude that climate in the Caribbean is changing in line with global trends. The effect of this is already being felt by agricultural producers in the region. A planned response to this changing climate has, as yet, not been developed and articulated. In the Caribbean, agriculture still remains a very important component of the socio-economic well-being of most of the people and so a meaningful response to the impending dilemma is imperative. Agricultural production systems are part of a wider natural ecological system and must exist in harmony with it if agricultural production is to be enhanced. This requires a conscious shift to more ecologically friendly agricultural production systems. In this presentation the principles of a sustainable agricultural system in the region are described. This is then followed by examples of sustainable practices which are already in use or are being assessed in the region in relation to mitigating and adapting to climate change.

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Climate change in the policy agenda of the Caribbean agricultural sector
Mark Bynoe, PhD. (Environmental/Resource Economist, Caribbean Community Climate Change Centre)

Livestock, Climate Change, and Brachiaria
2010. CIAT Brief No. 12
Full Text
You don’t hear much about nitrification in the news; its formidable environmental impact is usually eclipsed by coverage of carbon dioxide emissions. But this natural microbial process in soil causes the conversion of fertilizer nitrogen into nitrous oxide, a greenhouse gas 300 times more potent than carbon dioxide.

With the seven-fold rise in the use of nitrogen fertilizers since the 1970s directly linked to booming levels of nitrous oxide, tackling nitrification is crucial to tackling climate change.

Recent CIAT research shows that one promising option is contained in the roots of the tropical forage grass Brachiaria humidicola. As well as being highly nutritious and palatable to ruminants, brachiaria inhibits nitrification.

Livestock production has been almost universally vilified in climate change debates, but brachiaria’s biological nitrification inhibition capacity could see the grass take center stage in the push to significantly reduce the greenhouse gas footprint not just of livestock production, but arable farming too.

Compound interest
CIAT scientists had known for more than 25 years that brachiaria grass could suppress soil nitrification, but they only recently found out how its biological nitrification inhibition capacity works. …..

…. CIAT’s Tropical Forages Program is now looking into whether the widespread use of brachiaria hybrids could herald a new dawn of low-nitrifying crop-livestock systems. Since the availability of ammonium in the soil triggers and sustains the release of brachialactone, the benefits of a shift towards ammonium-dominated agricultural systems that include crops and forages with moderate-to-high biological nitrification inhibition capacity are under investigation.

http://www.ciat.cgiar.org/Newsroom/Documents/brief12_livestock.pdf
On the use of statistical models to predict crop yield responses to climate change
David B. Lobell, Marshall B. Burke
Abstract: Predicting the potential effects of climate change on crop yields requires a model of how crops respond to weather. As predictions from different models often disagree, understanding the sources of this divergence is central to building a more robust picture of climate change’s likely impacts. A common approach is to use statistical models trained on historical yields and some simplified measurements of weather, such as growing season average temperature and precipitation. Although the general strengths and weaknesses of statistical models are widely understood, there has been little systematic evaluation of their performance relative to other methods. Here we use a perfect model approach to examine the ability of statistical models to predict yield responses to changes in mean temperature and precipitation, as simulated by a process-based crop model. The CERES-Maize model was first used to simulate historical maize yield variability at nearly 200 sites in Sub-Saharan Africa, as well as the impacts of hypothetical future scenarios of 2 °C warming and 20% precipitation reduction. Statistical models of three types (time series, panel, and cross-sectional models) were then trained on the simulated historical variability and used to predict the responses to the future climate changes. The agreement between the process-based and statistical models’ predictions was then assessed as a measure of how well statistical models can capture crop responses to warming or precipitation changes. The performance of statistical models differed by climate variable and spatial scale, with time-series statistical models ably reproducing site-specific yield response to precipitation change, but performing less well for temperature responses. In contrast, statistical models that relied on information from multiple sites, namely panel and cross-sectional models, were better at predicting responses to temperature change than precipitation change. The models based on multiple sites were also much less sensitive to the length of historical period used for training. For all three statistical approaches, the performance improved when individual sites were first aggregated to country-level averages. Results suggest that statistical models, as compared to CERES-Maize, represent a useful if imperfect tool for projecting future yield responses, with their usefulness higher at broader spatial scales. It is also at these broader scales that climate projections are most available and reliable, and therefore statistical models are likely to continue to play an important role in anticipating future impacts of climate change.
Keywords: CERES-Maize; Africa; Marksim; Maize
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V8W-50T9465-1&_user=10&_coverDate=08%2F17%2F2010&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&m5=27b8cac6bd01ee9955abcd2f3da6fb
Agricultural and Forest Meteorology http://www.sciencedirect.com/science/journal/01681923

INVASIVE SPECIES:

Chilli thrips

Biological response of chilli thrips, Scirtothrips dorsalis Hood (Thysanoptera: Thripidae), to various regimes of chemical and biorational insecticides
Dakshina R. Seal, Vivek Kumar
2010. Crop Protection 29(11): 1241-1247
Abstract: The chilli thrips Scirtothrips dorsalis (Hood) (Thysanoptera: Thripidae), a new invasive pest in the USA, is an economically important pest of certain vegetable, ornamental and fruit crops in southern and eastern Asia, Oceania and parts of Africa. These crops cannot be protected from the pest without resorting to the use of chemical insecticides. In order to forestall or delay the development of insecticide resistance in S. dorsalis, we continued our focus on the discovery of insecticides with different modes of action for rotational use. In this study we evaluated candidate insecticides to control S. dorsalis on ‘Jalapeno’ pepper, Capsicum annuum L.; these materials belong to different IRAC mode of action classes as follows: (i) 4A – neonicotinoids, i.e., imidacloprid, thiamethoxam and dinotefuran, (ii) 5 – spinosyns, i.e., spinosad and spinetoram, (iii) 3A – pyrethroids, i.e., β-cyfluthrin, esfenvalerate, ζ-cypermethrin and λ-cyhalothrin and (iv) 8D – borax mixed together with orange oil and detergents in the TriCon® formulation. In addition we evaluated the entomopathogenic fungus, Beauveria bassiana (Botanigard®) alone and in combination with the borax formulation at ½ of their usual rates of application. Each of the 3 neonicotinoid insecticides when applied either as a single foliar spray or as a soil drench significantly suppressed both adults and
larvae for at least 10 days; indeed imidacloprid did so for 15 days. Dinotefuran was more effective as a foliar spray than as a soil drench. Spinosyns applied as a single foliar spray, significantly suppressed both adults and larvae through 15 days after treatment (DAT). None of the 4 pyrethroids provided significant suppression of either adults or larvae. The borax formulation suppressed adults and larvae through 10 DAT. B. bassiana significantly suppressed only the larvae at 5 DAT and not at 10 DAT. This study brings the number of insecticides known to be effective against S. dorsalis to 10 and these belong to 7 different modes of action classes. The use of such insecticides in rotation belonging to different classes will help delay the development of insecticide resistance in S. dorsalis.

Keywords: Biorational insecticides; Spinosyns; Beauveria bassiana; Borax; Integrated rotational use

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T5T-50R63FD-2&_user=10&_coverDate=08%2F08%2F2010&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=e832e9b00ed8112cc94958e82870ee16

### Papaya Mealybug

**A new pest for Jamaica: Paracoccus Marginatus, the Papaya Mealybug**

2010. Ministry of Agriculture and Fisheries, Research and Development Division; RADA Training Unit Jamaica. [Fact sheet]

**Introduction** “In September 2010, the pest was detected in Jamaica on a sample of teak (Tectona grandis) collected in the Constant Spring Area, St. Andrew.”


### Pink Mealybug

**Potential of extracts of the tropical plant Balanites aegyptiaca (L) Del. (Balanitaceae) to control the mealy bug, Maconellicoccus hirsutus (Homoptera: Pseudococcidae)**

Satish V. Patil, Bipinchandra K. Salunke, Chandrashekhar D. Patil, Rahul B. Salunkhe, Pankaj Gavit, Vijay L. Maheshwari


**Abstract**: The effects of extracts of different parts of the perennial tropical plant *Balanites aegyptiaca* (L) Del., including various solvent extracts of roots, methanol extracts from leaves, fruits, flowers and roots, partially purified saponins obtained from its roots and a standard saponin, were studied on the life cycle (adult longevity, number of eggs, crawlers, adults, weight of adults and % wax content) of a laboratory-reared parthenogenic line of the mealy bug, *Maconellicoccus hirsutus* (Homoptera: Pseudococcidae). Extracts derived from various parts of *B. aegyptiaca* (leaves, fruits, flowers, and roots in methanol) affected the life cycle of *M. hirsutus* with a methanol root extract being the most effective at a concentration of 500 μg ml⁻¹. Partially purified saponin of *B. aegyptiaca* and the commercial bark saponin extract (Sigma) from *Quillaja saponaria* at a concentration of 500 μg ml⁻¹ were effective in reducing the longevity of *M. hirsutus*. Significant reductions in oviposition by *M. hirsutus* were found for all the extracts at a concentration of 500 μg ml⁻¹. Extracts also affected the number of emerging crawlers, number of adults as well as the weight and wax content of emerging adults. These studies suggest that *B. aegyptiaca* plant extracts and saponins can be useful botanical insecticides for the protection of crops from mealy bugs.

Keywords: *Balanites aegyptiaca*; Saponin; Mealy bugs; *Maconellicoccus hirsutus*; Longevity; Wax

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T5T-5091Y5C-2&_user=10&_coverDate=11%2F30%2F2010&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=1737b744ca3240bf711d12ac946188&searchtype=a

**Crop Protection** http://www.sciencedirect.com/science/journal/02612194
Red Palm Mite

Field trials to determine the efficacy of three chemicals in the control of the Red Palm Mite (Raoiella indica Hirst) on coconut (Cocos nucifera) in Saint Lucia

Guy Mathurin, Germain George (Ministry of Agriculture, Lands, Forestry and Fisheries, Research & Development Division, St. Lucia) and Bruce Lauckner (CARDI, Trinidad and Tobago)


Abstract: Field trials were conducted at several sites in St. Lucia with the aim of investigating the efficacy of four readily available chemicals (GC-Mite, Kumulus, Lime Sulphur and Safe Oil) in the control of the Red Palm Mite (Raoiella indica Hirst). The trials were conducted from mid 2007 to the end of 2008. Results demonstrated that Safe Oil gave the best control for the first half of the experimental period with GC-Mite being the least effective, but in the final 3 months Kumulus and Lime Sulphur seemed to give the best control.


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OTHER AGRICULTURAL ASPECTS

Agricultural Research

Agriculture and nutrition in the Caribbean: implications for research & development

Dr. Fitzroy J. Henry, Director, Caribbean Food and Nutrition Institute, (PAHO/WHO), Jamaica

2010. CARDI Review April (issue 9):3-13

Abstract: Agricultural policy in the Caribbean has been mainly market driven, with primary focus on increasing production and productivity; competitiveness. However, if food and nutrition security in the Caribbean is to be improved, agricultural policy has to include nutritional considerations.

This paper proposes several lines of action for bridging the gap between nutrition and agriculture that has historically characterised Caribbean agriculture:

- Policy - establishing nutrition goals as a key determinant for food and agriculture policy decisions
- Technical - identifying the nutritious foods that will be given priority support in agricultural production, marketing and promotion
- Technological - ensuring appropriate technological innovations are applied to enhance and preserve the nutritional quality of priority foods
- Education/training - emphasising education and integrated training among professionals in the various sectors related to the above

Some research issues are identified:

- Examination of the inter-relationship between agriculture, nutrition and health in the Caribbean
- Analysis of our national domestic food production and import policies in relation to health
- Determination of who are food insecure, who are the most vulnerable groups, where they are located and the nature and causes of the food insecurity problem
- Food economics
- To what extent within the WTO agreements can incentives and subsidies for local staples and other foods be used to replace imports with a view to reducing the import bill, and improving health
- Research on pulses and ground provisions should be accelerated to ensure that these crops benefit from new technologies to the same extent as cereals
- Breeding nutritionally superior quality produce from ground provisions
- Biofortification of rice, cassava, peas, yams, plantains
- Food processing / preservation


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**Agricultural Development - Caribbean**

*Ministry of Agriculture & Fisheries - Performance Highlights 2009-2010*

**Agricultural Development - World**

*The Journal of Agricultural Science Volume 149 - Supplement S1 Feb 2011 (Foresight project on global food and farming futures)*
- Improving the productivity and sustainability of terrestrial and aquatic food production systems: future perspectives
- The future of animal production: improving productivity and sustainability
- Crop biotechnology: prospects and opportunities
- Integrated soil management – moving towards globally sustainable agriculture
- Postharvest losses and waste in developed and less developed countries: opportunities to improve resource use
- Global advances in weed management
- Engineering advances for input reduction and systems management to meet the challenges of global food and farming futures
- Potential impacts of climate change on marine wild capture fisheries: an update
- Innovation and productivity in dryland agriculture: a return-risk analysis for Australia
- New opportunities to control livestock diseases in the post-genomics era
- Novel crop science to improve yield and resource use efficiency in water-limited agriculture

[http://journals.cambridge.org/action/displayIssue?jid=AGS&volumeId=149&seriesId=0&issueId=S1](http://journals.cambridge.org/action/displayIssue?jid=AGS&volumeId=149&seriesId=0&issueId=S1)

**OECD-FAO Agricultural Outlook 2010-2019**
- OECD-FAO Agricultural Outlook 2010-2019 highlights. 88pgs

  Further details about the Outlook can be found at [www.agri-outlook.org](http://www.agri-outlook.org).

**The outlook for agriculture and rural development in the Americas: a perspective on Latin America and the Caribbean**
2010. Inter-American Institute for Cooperation on Agriculture, Chile; FAO
[http://www.iica.int/Esp/organizacion/LTGC/modernizacion/Publicaciones%20de%20Modernizacion%20Institucional/B20051.PDF](http://www.iica.int/Esp/organizacion/LTGC/modernizacion/Publicaciones%20de%20Modernizacion%20Institucional/B20051.PDF)
The state of food insecurity in the world 2010
2010. FAO, Rome

Marketing / Trade

Co-op / cluster training manual: developing effective clusters for the New Agriculture in Belize
Caribbean Agricultural Research and Development Institute, (Belize).
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The Economic Partnership Agreement: towards a new era for Caribbean trade
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Summary: The Economic Partnership Agreement (EPA) signed in 2008 signalled a new era of trade relations between the European Union (EU) and the Caribbean Forum of African, Caribbean and Pacific States (CARIFORUM). Caribbean exporters previously had greater duty-free access to the EU market than European exporters enjoyed in the Caribbean, along with quotas that enabled them to avoid price competition with rivals from outside the Lomé ACP (Africa, Caribbean and Pacific) bloc.
With the advent of the World Trade Organization (WTO) in 1995, the EU and the Caribbean were forced to negotiate new terms of engagement. The EPA represented a shift towards a more liberal trading regime in which greater reciprocity is the norm.
Critics of the EPA believe the new trade regime will inhibit the development of new (particularly manufacturing) industries in the region and worsen the fiscal accounts of Caribbean countries. This paper, however, concludes that the aggregate negative impact of the EPA on Caribbean states will be modest, although it will likely produce challenges for smaller Caribbean governments. In particular, this paper emphasizes that the EPA will not be effective without the successful implementation and operation of the Caribbean Single Market Economy (CSME), which requires Caribbean governments to plan and coordinate economic activities together. The EPA provides the opportunity for the region to build the framework that will allow it to compete in a liberalized global economy, where a competitive environment is necessary for survival.
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