CARDI

St. Kitts and Nevis

Country Highlights 2009

CARDI's contribution to agricultural research and development, food production and the reduction of poverty and hunger

Improving lives through agricultural research

Caribbean Agricultural Research and Development Institute

COUNTRY HIGHLIGHTS 2009

CARDI's contribution to
agricultural research and development,
food production and the reduction of poverty and hunger

CARDI OFFICE IN ST KITTS AND NEVIS
September 2010

PSC # SK/002/10

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Acronyms and abbreviations

CARDI	Caribbean Agricultural Research and Development Institute
CIAT	International Centre for Tropical Agriculture
CIP	International Potato Centre
CPGCA	Christiana Potato Growers Cooperative Association
CTM	Mission of the Republic of China on Taiwan
DoA	Department of Agriculture
IICA	Inter American Institute for Cooperation on Agriculture
IPM	Integrated Pest Management
K	Potassium
N	Nitrogen
P	Phosphorous
PA	Protected Agriculture
S	Sulphur
SVG	St. Vincent and the Grenadines
USDA	United States Department of Agriculture

1.0 FOREWORD

CARDI continued to support the programmes of the Department of Agriculture during the year. The CARDI work programme as advised by the Department of Agriculture, included management of the major sweet potato pest *Cylas formicarius,* demonstration of hot pepper production technologies and support in the control of invasive species

In May 2009 the CARDI Representative duties for the St Kitts and Nevis Unit were assumed by Ms Pathleen Titus, having transferred from St Vincent and the Grenadines.

The major task was to transform the approximately 6 ha at Estridge into a field station. Among the several challenges encountered were scarce financial resources, lack of labour to execute the tasks and extreme drought conditions during the entire growing season. Nevertheless, a number of projects were attempted with some degree of success.

The CARDI Representative and staff of the St Kitts and Nevis Unit wish to acknowledge the continued collaboration between CARDI and its main stakeholders and collaborators, the Department of Agriculture (DoA), Inter American Institute for Cooperation on Agriculture (IICA), Mission of the Republic of China on Taiwan (CTM) and the many farmers on whose fields trials were conducted.

Pathleen Titus
CARDI Representative, St Kitts and Nevis

2.0 REVIEW AND UPDATE OF THE AGRICULTURAL AND RURAL SECTORS

Agriculture remains one of the priority sectors for the Government of St Kitts and Nevis. An Agricultural Development Strategy has been set in place to ensure food security, bearing in mind the many global threats. The strategy aims to reduce food imports by stimulating local production. Government has adopted a multidisciplinary approach, which includes:

- Incentive packages
- Increased availability of land
- Investment in agro-processing technology
- Increased linkage to the tourism sector

In 2009, the Department of Agriculture reported increased production in several crops (pumpkin, onion, watermelon, sweet potato and pineapple) and decreases were observed for cabbage, sweet pepper, tomato, peanut and carrot. The sector was however plagued by praedial larceny, adverse weather conditions (both drought and heavy rainfall) and major pests, particularly the Diamond Back Moth.

The Director of Agriculture in his annual review reported that the fruit and tree crop sub- programme had achieved its objective of increasing the acreage under fruit and tree crops in an attempt to promote healthy lifestyles through the production and consumption of more fruits. Among the pests and diseases identified in this sub sector were pineapple mealybug, nematodes in guava and West Indian fruit flies in mango, wax apple, carambola and golden apple.

The Department is planning to acquire new equipment to augment the ageing fleet. The Units of Marketing, Plant Quarantine Animal Health and Animal Production all played major roles in the Department's work programme.

3.0 EXECUTIVE SUMMARY

Sweet potato remains an important crop in the Federation. An island wide collection of local accessions from farmers and CARDI was completed. Forty two accessions were collected and planted at the CARDI Field station at Estridge. The germplasm plot will be used to characterise the accessions.

In an attempt to further effect control measures for the major sweet potato pest *Cylas formicarius*, and to assess the efficacy of trap and lure types, a trial was established on a farmer's field at Mansion. The trial consisted of three trap types; bleach bottle, local Taiwanese constructed with water bottles and commercial Great Lakes and two different lures, Taiwanese and Great Lakes. The concentrations in both lures also differ with the Taiwanese lure having a strength of 1.0 mg and the Great Lakes 0.12mg. Each of the trap types was fitted with one of the two lures resulting in six different trap/lure combinations. Visual observations and insect counts from the trap/ lure combination, showed the bleach bottle/1.0mg combination captured twice as many weevils (60,000) as the next best performer (32,000). Data collection will continue until the farmer harvests the crop in January 2010. Statistical analysis will then be conducted.

Two sweet potato varieties were introduced from St Vincent and the Grenadines. Lover's Name is orange fleshed and recommended for processing. The other variety known as Agriculture, is red skinned /white fleshed, qualities that are desired by the export market. These varieties will be evaluated for adaptability to the local environment.

Collaboration continued with the Tissue Culture laboratory in St Vincent and the Grenadines (SVG). Plantlets of sweet potato varieties obtained from CIP earlier in the year were sent to the St Kitts Unit. The survival rate of the tissue culture material was low (<30 %) but four varieties prevailed, CARDI Big Red, TIS 9101, CN 1510 and Viola. They will be multiplied at Estridge for evaluation.

Cassava is another root crop of importance. A collection was done on mainland St Kitts where three accessions were gathered from CARDI and two farmers. Plantlets of the sweet variety CM 3306 from CIAT were also sent from the laboratory in SVG for hardening and field evaluation. Due to the low survival rate, only four of the initial thirty survived. They are planted at Estridge and will be monitored for growth and development and eventual multiplication. It is intended to share the planting material with Nevis as that island is also interested in sweet cassava. The hot pepper propagated at the CARDI compound at St Johnston Avenue were planted out at the Estridge Field Station both as a demonstration commercial plot and as a mulch experiment. The predominant variety was CARDI Red but there was also some CARDI Green. The mulch material used was grass. There were five replications with 10 plots per replication. Harvesting was done weekly from week eight. Parameters measured were plant height and weight of the harvested berries. The analysed data from the trial revealed that the mulched plots gave a significantly higher yield

than the unmulched ones. From the results it could also be concluded that when berry yield was highest, the superiority of the mulched plots was greatest. It was however quite difficult to sell the crop on the local market. The berries were eventually sold to a processor in Antigua.

The Protected Agriculture Project, which was initiated under the IICA/CARDI Agreement in 2007, was realised in 2009, when the PA structure was ordered from Christiana Potato Growers Co-operative Association (CPGCA) of Jamaica. The design ordered was considered best suited for the St. Kitts/Nevis conditions and measures 21m x 6m. The PA system is expected to be delivered in early 2010.

A survey was conducted by CARDI with the assistance of the St Kitts and Nevis Hotel and Tourism Association in order to find out what are the vegetable and seasoning needs of the hospitality sector. The survey results will be used to inform the farming community of those needs. The manager of the Association distributed the survey instrument among 27 of its members. To date 13 have completed the questionnaire and several others have promised to do so.

A shade house measuring 12m x 9m was built on the field station, not only to accommodate tissue culture plantlets but also seedlings.

The area where the Field Station is located was previously under sugarcane. In the process of developing the field station, a nutrient assessment of the soils was conducted. Soil samples were sent to the Agro Services laboratory in Florida for analysis. The results indicated that the soils are acidic, magnesium levels are adequate and calcitic lime is needed for optimum plant growth. The major nutrients (N,P,K and S) should also be added to the soil. The minor nutrients, boron and zinc, are low and should be applied either to the soil or as a foliar spray.

The CARDI Work Programme for 2010 was guided by the results of the consultation with the Permanent Secretary and the Director of Agriculture. The suggested work programme was essentially a continuation of the previous year's programme except for the addition of a livestock component.

4.0 St. Kitts: Implementation of the Medium Term Plan 2008 – 2010

4.1 Development of sustainable industries

4.1.1 Commodity development: crops

4.1.1.1 Sweet potato: Controlling *Cylas formicarius*

Sweet potato is the most widely consumed root crop in the Federation of St. Kitts/ Nevis. Annual output has risen steadily since 1997 from 136 000 kg to an estimated 272 000 kg in 2007. The potential for further expansion exists through exports to the neighbouring islands north of St. Kitts/ Nevis; however a major limiting factor is the West Indian sweet potato weevil, which is the most serious pest in the field and in storage.

In an effort to reduce losses the DoA sought the assistance of CARDI. Collaborative work involving IPM has been ongoing with an emphasis on mass trapping of male sweet potato weevils. In October 2009, a field experiment was established (Plate 1) to evaluate the efficacy of different trap/ lure combinations in capturing the targeted pest. Three types of traps were used; Great Lakes commercial, Taiwanese made from water bottles and bleach bottle trap (Plates 2-4). The two lures in the trial were of different concentrations, Great Lakes (0.12mg) and Taiwanese (1mg). Each of the three trap types was fitted with one of the two lures producing six trap/lure combinations. The field trial consisted of placing the 6 trap/ lure combinations at fixed sites equidistant from each other along a straight line running in a north westerly direction. Setting the traps perpendicular to prevailing north easterly trade winds reduced intermixing of pheromone "scents" between traps. The traps were rotated randomly each week. The experiment was located in the Mansions farming district in a 0.35 ha sweet potato field about 2 months old. The area had other fields in various stages of development as this is a typical sweet potato district plagued by weevil problems. The experiment will terminate when the crop is harvested at the end of January.

After 8 weeks of trapping, over 200,000 weevils were captured. The bleach bottle/ 1.0mg apparatus appears superior, capturing over 60, 000 weevils, nearly twice that of the next best performer with 32,000. The trap recording the least weevils (17,000) was the Taiwan trap containing the Taiwan lure. Except for week 8, when only 10,000 insect pests were entrapped, there was no obvious trend that the weevil count was dwindling as the weeks progressed. In weeks 1 and 5 over 35,000 adults were entrapped compared to 26,000 in weeks 3 and 7. No conclusion can be made as the experiment is still ongoing. However, while the experimental emphasis is on trap efficacy, the weevil population in Mansions is a clear indication of the extent of the pest management challenges local agriculture faces.

Table 1: Weekly weevil catch of *Cylas formicarius* using six trap/lure combinations

Wk no	Week	CLX/*T*	GLC/T	GLC/GL	T/GL	CLX/GL	T/T	Total
1	4-Nov	10,860	7,298	2,900	11,376	4,605	1,660	38,699
2	11-Nov	11,050	1,535	237	703	1,437	143	15,105
3	18-Nov	8,608	11,530	2,395	3,183	1,603	310	27,629
4	25-Nov	7,127	2,900	6,130	2,693	2,913	1,300	23,063
5	2-Dec	9,278	3,038	4,578	9,955	3,408	5,120	35,377
6	9-Dec	5,926	6,476	1,835	4,168	6,236	927	25,568
7	16-Dec	6,568	1,670	3,774	1,580	1,710	2,248	17,550
8	23-Dec	5,790	2,746	5,396	6,764	1,776	3,840	26,312
9	30-Dec	1,750	1,420	4,040	327	1,097	1,583	10,217
	Total	66,957	38,613	31,285	40,749	24,785	17,131	219,520

KEY
Traps /Lures
CLX/GL- Clorox Bottle/ Great Lakes
CLX/T- Clorox Bottle / Taiwanese
GLC/GL – Great Lakes commercial / Great Lakes
GLC/T – Great Lakes commercial / Taiwanese
T/GL- Taiwanese/ Great Lakes
T/T- Taiwanese/ Taiwanese

Plate 1: Sweet Potato plot with pheromone traps

Plate 2: Great Lakes Commercial sweet potato trap used in trial

Plate 3: Pheremone trap constructed from bleach bottle

Plate 4: Taiwanese Pheremone trap constructed from water bottles

Germplasm collection

Characterisation of the sweet potato accessions available on St. Kitts started with the collection of 42 of these accessions from four farmers and from CARDI as seen in Plate 5. These accessions were planted at the CARDI Field Station, Estridge. Added to this collection of local varieties were two from St. Vincent and the Grenadines, Lover's Name and Agriculture. The former is orange fleshed and has good processing qualities which are desirable for the sweet potato export market.

Collaboration with the tissue culture laboratory in St. Vincent and the Grenadines continued. Plantlets of four sweet potato varieties obtained from CIP were sent for hardening and eventual evaluation. The survival rate of the plantlets was low (less than 60%). Nevertheless, small plots of CARDI Big Red, TIS 9101, CN 1510 and Viola were established on the Field Station.

Varieties collected Islandwide and planted at CARDI Field Station, Estridge

Collected from Mrs. Nisbett
Clarke
Black Vine
Sugar Root
Connor
Factory Red
TTM Red skin orange flesh
TTM 57
TTM Brown skin orange flesh
Never Miss
Red skin white flesh (2 varieties)
SSMC Brown
Red skin green flesh
N1, N2, N3, N4, N5, N6, N7

Collected from Jimmy Thompson
Brown skin cream flesh
Sugar root (brown skin white flesh)
Sugar root (brown skin orange flesh)
Red skin cream flesh (2 varieties)
Cabey

Collected from Roland Mills
Roland
White skin white flesh
TTM brown skin orange flesh
TTM white skin white flesh

Collected from Joseph Proctor
Red skin orange flesh
Sugar Root (brown skin orange flesh)
Cabey

Collected from CARDI
Agriculture, Regal, 97K-11
Lover's Name, Romney Vine
Kenneth, Green Acres
Mandella, CARDI (1)

Plate 5: The sweet potato germplasm collection plot at the CARDI Field Station, Estridge, St. Kitts

Plate 6: Hardened sweet potato tissue culture plantlets at CARDI's Field Station

4.1.1.2 Cassava

Cassava is the other root crop of importance to the Federation. Three local accessions (two designated Green Stem and Red Stem), were collected from three sites and planted at the CARDI Field station (Plate 7). Plantlets of CM 3306-4 were obtained from the laboratory in St Vincent and the Grenadines. Due to poor survival rate (Plate 8), only 13 plants survived. The CM 3306-4 surviving plantlets were planted at the CARDI Field station.

Plate 7: Hardened plantlets of cassava variety CM 3306-4 at CARDI Field Station

Plate 8: Local cassava accessions growing at Estridge Field Station

In June the hot pepper seedlings produced at the CARDI compound were planted in the field at Estridge (Plate 9). The plot served both as a commercial and demonstration one and also accommodated a mulch experiment. The material used in the mulch was grass. There were five replications with 10 plots per replication. The berries were harvested weekly beginning at week 8. Data was collected on number, weight and size of berries.

Bradbury Browne from the CARDI Antigua Unit was brought in to assist in setting up the irrigation system at Estridge in order to facilitate production of hot peppers. Water was however still a limiting factor as can be seen from the peppers in Plate 10 and from rainfall data (Fig 1). The peppers which had adequate water were larger and of better quality than those which did not. The supply was intermittent and the water pressure was often low.

The results of the trial indicated that the mulched plots gave a significantly higher yield than the un-mulched ones (Table 2). Average berry weight, total berry weight and number of berries harvested were all larger for mulched than un-mulched plots (Figures 2-4). From the analysed data it can be concluded that when berry yield was highest, the superiority of the mulched plots was greatest. It was however quite difficult to sell the crop on the local market. A market was eventually obtained with a processor in Antigua.

Plate 9: Hot pepper plot at CARDI Field Station, Estridge, St. Kitts

Plate 10: Hot pepper harvested at CARDI Field Station, Estridge showing peppers grown under drought and no drought conditions

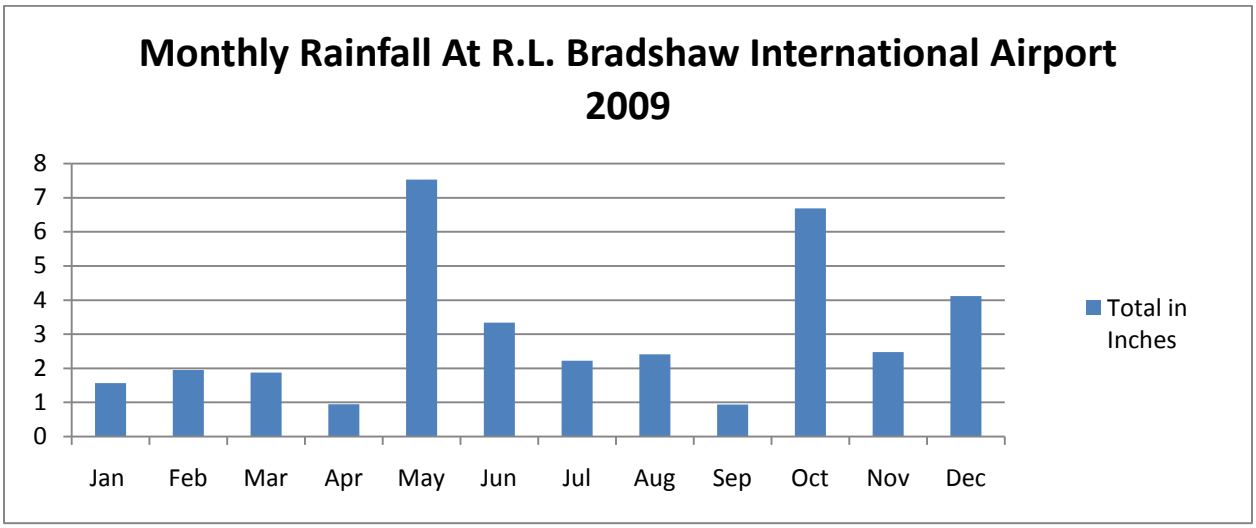


Figure 1: Monthly rainfall data for the year 2009

Table 2: Means of hot pepper grown at CARDI Field Station, Estridge, St. Kitts under mulch and no mulch conditions

Parameter	Grand mean	No mulch	Mulch	SED
Total weight (kg)	4956	3783	6130	500.2
Total berries	509	393	624	45.7
Average weight (kg)	9.49	9.21	9.77	0.26

Figure 2: Comparison over time of average berry weight of hot pepper grown under mulch and no mulch conditions at CARDI Field Station, Estridge, St Kitts

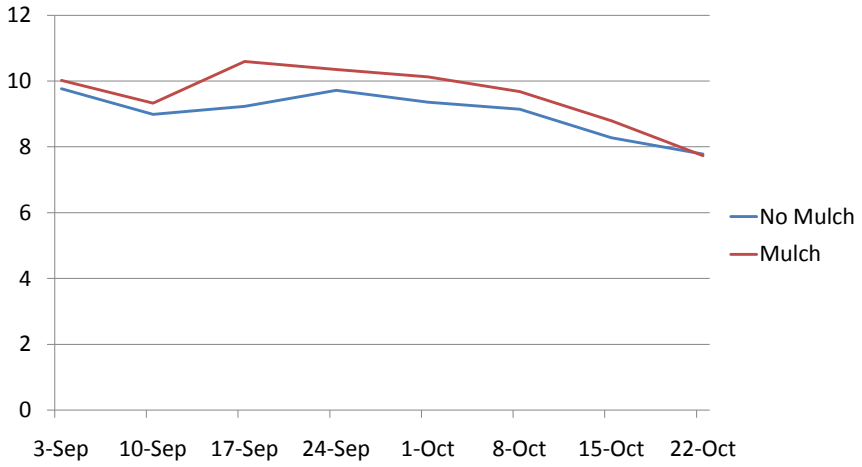


Figure 3: Comparison over time of the number of berries from hot pepper grown under mulched and no mulch condition at CARDI Field Station, Estridge, St Kitts

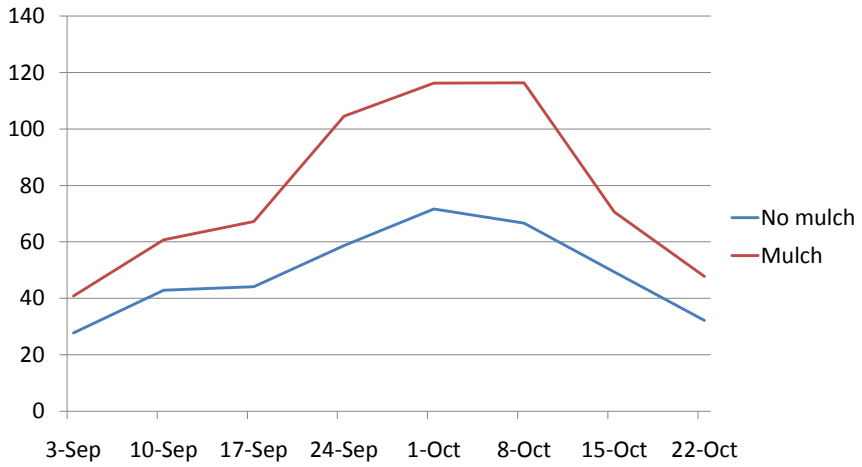
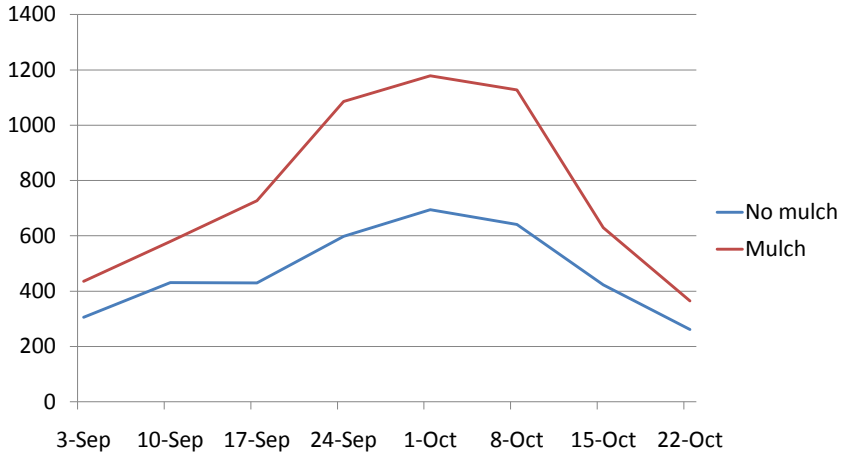


Figure 4: Comparison over time of total weight of berries grown under mulch and no mulch conditions at CARDI Field Station, Estridge, St Kitts



Technical assistance in hot pepper

The Unit continued providing technical assistance to farmers growing hot peppers. Information was provided on density, nutrition and pest and disease control. Efforts of most of these farmers were thwarted either by severe drought or the fact that their crop was destroyed by animals. At the end of the year, one farmer asked the St Kitts Unit to arrange the purchase of seeds from the Antigua Unit.

4.1.2 Emerging Issues

4.1.2.1 Protected Agriculture: Development of commercial vegetable production systems for St Kitts and Nevis

This project is designed to contribute to the diversification of the agricultural sector of St Kitts and Nevis by providing high quality vegetables primarily to the hospitality sector. Under the IICA/CARDI/ Agreement, the St Kitts Unit will acquire a Protected Agriculture structure which will be used as a demonstration unit for the farming community in St Kitts/Nevis. Under this structure, a number of production practices will be evaluated for efficiency and cost. Vegetable varieties will be evaluated to assess their suitability for production under the Protected Agriculture system. There will also be monitoring of pests and diseases under these conditions and demonstration of a fertigation system.

The structure, measuring 21m x 6m was ordered from Christiana Potato Growers in Jamaica. The expected delivery for December was delayed and the structure is now scheduled to arrive in St Kitts in early 2010.

Survey of hospitality sector

The aim is to establish a database on market demands and requirements for vegetables produced under Protected Agriculture systems. To accomplish this, a survey was designed to collect data on needs of the hospitality industry as it relates to vegetables and seasonings. The St Kitts and Nevis Hotel and Tourism Association distributed the survey instrument to its members for completion. Thirteen members responded so far and efforts are being made to collect surveys from more members.

4.1.3 Natural Resource Management

4.1.3.1 Invasive species

The CARDI Unit in St Kitts and Nevis continued to participate in diagnostics, surveys and training for invasive species management.

The Unit's staff was part of a field team which collaborated with the Department of Agriculture and visiting USDA scientists to collect Red Palm Mite specimens and look for natural enemies. During the year, CARDI's staff also participated in training workshops of the Department of Agriculture and took part in diagnostic field visits of DoA.

Soil health

The land on which the Field Station is situated was under sugarcane for a number of years. In an attempt to get an idea of the nutrient composition of the soil, soil samples were sent to Agro Services International Laboratory in Florida for analysis. Samples were taken as per instructions by the laboratory. Four thoroughly mixed samples representative of the field were taken.

A complete analysis was done both for major and minor nutrients. The results (Table 3) showed that the soils were acidic with an organic matter content of 1.4% and needed an addition of calcitic lime for optimum plant growth.

Table 3: Results of soil analysis of CARDI Field Station Estridge as provided by Agro-Services Laboratory International

Optimum	Low
Calcium	Nitrogen
Magnesium	Sulphur
Copper	Boron
Iron	Zinc
Manganese	Potassium
Magnesium/potassium ratio	
Phosphorus	Phosphorous
Calcium/magnesium ratio	

4.2 Development of Strategic Linkages

4.2.1 Participation in exhibitions

The Unit participated in the annual St. Kitts Department of Agriculture Open Day held at La Guerite in April. Pest control was highlighted, in particular *Cylas formicarius* which is the major pest of economic importance in the Federation. Live specimens of the weevil in addition to two types of traps and lures were displayed. Literature acquired from CTA was also distributed to farmers.

4.3 Institutional Strengthening

4.3.1 Revenue generation

The hot pepper planted in the dry season served as a source of revenue for the Unit. After the processor on island could not buy the berries, a market was found at Susie's in Antigua. During December two shipments were made. Pumpkins were also sold locally.

5.0 NEVIS: IMPLEMENTATION OF THE MEDIUM TERM PLAN 2008 – 2010

5.1 Development of sustainable industries

5.1.1 Commodity development: crops

5.1.1.1 Sweet potato: Controlling *Cylas formicarius*

The Department of Agriculture expressed the desire to acquire new sweet potato germplasm, particularly red skinned white fleshed varieties which are well accepted on the island. Two varieties Lover's Name (carrot coloured) and Agriculture (red skinned, white fleshed) were introduced as tubers from St Vincent and the Grenadines (Plates 11-12). Both varieties sprouted profusely and were planted at Prospect Estate for evaluation (Plate 13). The plot was irrigated and vine growth was quite good. Tubers will be harvested in January 2010.

Plate 11: Chief Extension Officer examines sweet potato plot at Prospect Estate

Plate 12: Variety Agriculture introduced to Nevis

Plate 13: Variety Lover's Name introduced to Nevis

5.1.2 Commodity development: livestock

The Department of Agriculture in Nevis was interested in obtaining improved forages for small ruminant production. Small ruminants are an important part of agricultural production in Nevis. Many of these animals roam freely and feed on scrub. Consequently, growth rate is slow and carcass weight is reportedly low. In an attempt to improve both the quality and quantity of meat produced, the Department requested germplasm of improved forages. CARDI provided planting material of siratro, teramnus, glycine and guinea grass for evaluation.

CARDI also designed a survey questionnaire. The survey instrument will be used to gather information on the status of the small ruminant industry and the information obtained will assist in

planning the ruminant nutrition programme. It is hoped that in 2010 this important project will be executed.

Seeds of the forage legume *Dolichos lablab* were provided to the Agriculture Department by the CARDI Technical Services Manager. The Department requested material that could be used as forage. The seeds were cultivated (Plates 14-15) and the Department is currently collecting seeds for expansion.

Plate 14: Legume to be used for forage (*Dolichos lablab)* growing at Prospect Estate

Plate 15: Seeds and pods of forage legume *Dolichos lablab*

5.1.3 Emerging Issues: protected agriculture

There is an interest in using PA systems to increase the quality and quantity of vegetables produced on island. The results of the trials generated at the structure acquired under the IICA/CARDI program in St Kitts will be transferred to Nevis, where CARDI will assist the Department in monitoring and evaluating vegetable varieties and pests and diseases.

5.2 Development of strategic linkages

5.2.1 Participation in exhibitions

The Unit participated in the annual exhibition held in Nevis in March. The display was similar to that mounted in St. Kitts, 1 month later (see above).

6.0 Staff members

Pathleen Titus
CARDI Representative

Melvin James
Research assistant

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Senior Technician

Laurence Knight
Technician

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Samantha Samuel
Administrative assistant

7.0 Contact information

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