2014 University of the Virgin Islands Research Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The work conducted by AES scientists is production oriented. The small size of AES and limited physical and fiscal resources limit our ability to expand into new research areas. One way of addressing this issue is developing collaborations with other departments and institutions. AES has continued to collaborate with the other insular land grant institutions to obtain funds for student support in AES labs. The Resident Instruction funds at UVI are used to support students who conduct research projects in AES labs and present their results at local, regional and national conferences. AES has undergone contraction to four research programs and 2.8 faculty FTE in order to deal with budget cuts and restrictions. The four programs in AES currently are Agronomy, Animal Science, Biotechnology & Agroforestry, and Horticulture & Aquaculture. The Director of AES has an 80/20 split between administration and research (Animal Science). The Director of AES has been appointed to the Board on Agriculture Assembly Policy Board of Directors as the Insular Areas Representative. The assistant Director has a 40/60 split between administration and research (Biotechnology & Agroforestry).

The Agricultural Experiment Station hosted a summer internship that was supported by a grant from the US Department of Agriculture - National Institute of Food and Agriculture (USDA-NIFA) Resident Instruction in the Insular Areas program. Eight students from the insular land grant colleges in Puerto Rico, Guam, Federated States of Micronesia, Marshall Islands and American Samoa participated. Two UVI students, Shamali Dennery and Kenya Emanuel, who had participated in previous internships in Guam and the Northern Marianas Islands served as chaperones. The students spent time with each AES research program, participated in field and lab activities, visited local agricultural, historical and cultural sites and interacted with UVI students, staff and faculty.

Nine students were mentored in AES labs while conducting research during the summer of 2014. The students worked in Animal Science, Biotechnology, and Aquaculture. Students were supported by funds received from a USDA-NIFA Resident Instruction in the Insular Areas grant, a VI Department of Agriculture Specialty Crops Block grant, a Water Resources Research Institute (WRRI) grant, and a National Science Foundation Research Internships in Science of the Environment (NSF-RISE) grant.

The Animal Science program mentored three undergraduate students with support from the USDA-NIFA Insular Grants Program for Resident Instruction. The students conducted work that was part of an ongoing Hatch project and a multistate Hatch project (W-2173). Two students conducted research on parasite burdens of ewes and lambs with early and late weaning. The third student conducted a project to evaluate stress in ewes and lambs at the time of weaning by collecting hair and blood samples for cortisol analysis. The project is a collaboration with colleagues at the University of Tennessee through the W-2173 project. The Research Specialist that assisted with the research activities resigned in the Summer of 2014. The position has been advertised and candidates are being sought. A new research analyst was hired to manage the sheep research farm and a second Agriculture Aide was hired to assist with the day to day labor on the sheep farm. Another Ag Aide was hired to assist with work at the cattle ranch. The land housing the cattle herd is privately owned and is being leased out to a new tenant which means that the university has to locate new land for the cattle herd. Negotiations have taken place with the VI Dept. of Agriculture to gain access to approximately 200 acres of land that they own. The process of developing the lease, at no cost to UVI, and getting permits for land clearing has begun and it is hoped that activity on the new land will begin in FY 15.

The Agronomy program continues to strengthen its research capacity and diversify research interests. The Agronomy research program is currently investigating innovative technical scientific advancements and progressive management methods in targeted agricultural disciplines. Research areas include a cropping systems approach with an emphasis on biological ecosystem services and alternative agriculture management practices. Current focus areas are integrated crop livestock production systems, cover crop technologies, soil quality conservation, water resource management, and pasture-based livestock production. The Agronomy program is in its third year of the Southern SARE grant and has completed the evaluation of numerous cover crop species and within species cultivars. Promising cover crops were evaluated to determine continued ecosystem services on subsequent horticulture rotations. One particular study examined the continued effect of cover crop surface residue utilized as surface sheet mulch for continued weed suppression in subsequent pepper production. Both sunn hemp and sunflower exhibited strong suppression up to six weeks after pepper transplanting and yielded higher pepper weights than peppers grown under conventional methods. This research is being mirrored by collaborators at the University of Puerto Rico and the University of Florida. The Agronomy program has demonstrated how sunn hemp can be no-till planted into poor quality native pastures and used to improve pastures. The high grazing value of this legume has the ability to improve sheep performance and withstand extended periods of rotational grazing by sheep. Results from these projects and others were presented at a number of different workshops, seminars and professional meetings.

The Horticulture & Aquaculture program continued to investigate research interests under their USGS-WRRI, USDA-SCBG and Hatch projects. These projects are in collaboration with UVI-CES, the VI Department of Agriculture, local farmers and USDA to help improve crop performance and to develop technical strategies to address on farm challenges in the production of fruits and vegetables. Over the past year, these projects involved three student workers whom provided project assistance and received valuable agricultural science experience. Projects involved the evaluation of snow pea, sugar snap pea, and butternut squash cultivars for adaptability, fruit quality and fruit yield. Mango saplings started from local kidney mango trees provided root stock for grafting 10 improved mango varieties new to the territory. Major renovations and infrastructure improvements were made to develop a sustainable rainwater harvesting, storage, and irrigation distribution facility for use in Horticulture Program Research. The goal of this project is to conduct horticultural research that is independent from municipal water sources, relying solely on captured and stored rainwater for irrigation purposes.

The Aquaculture Program conducted another season of aquaponic short courses, which consisted of four courses and instructed 60 students from around the world. The Aquaculture Program continued research into vegetable production within its world-renowned aquaponic production system. Aquaponic vegetable production methods were researched to examine the effects of different foliar applications of calcium and phosphorus on plant and fruit nutrient deficiencies such as blossom end rot in squash. New vegetables were tested and different vegetable cultivars were evaluated to determine the highest performing vegetable cultivars for use in aquaponic systems. Evaluations were conducted on multiple varieties and harvest methods of kale, swiss chard, pak-choi, bok-choy, eggplant, zucchini, basil, marigolds, lettuce, squash, chives, okra and sorrel.

Biotechnology focused on the nutrient needs for papaya in calcareous soils with high pH (8.2 - 8.5) calcium and potassium content. Because papaya is a multiyear crop, normally 1 - 1.5 years in the USVI, data continued to be collected during through June of 2014. The calcareous soils at the Agricultural Experiment Station contain a naturally high level of potassium and calcium. The addition of potassium at either 75 or 150 lb/acre had no effect on the production of the four papaya varieties and two hybrids evaluated after one year of production. Papaya growth, fruit set and production are not influenced by the additional application of potassium to papaya grown on calcareous soils with naturally occurring high levels of potassium. Four UVI undergraduates were mentored on research project and each student presented the results of the research at local and/or national conferences. Ginger was grown and evaluated for production potential in the US Virgin Islands. Due to the year long growing requirement and low production in the calcareous soils, ginger would work best as a backyard garden crop then a commercial adventure.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	10.2	0.0
Actual	0.0	0.0	10.2	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Combined External and Internal University External Non-University Panel

2. Brief Explanation

The Agricultural Experiment Station (AES) uses internal reviewers from academic faculty and Cooperative Extension Service as well as external professionals from the VI Dept. of Agriculture to review Hatch proposals. The AES has an advisory council of active farmers in the community that provide input on the research being conducted and ideas of areas to focus on to resolve agronomic challenges in the US Virgin Islands.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public

Brief explanation.

Stakeholder participation is encouraged through our advisory council and interaction at workshops, yearly agricultural fair and World Food Day activities. AES is often featured on radio farm broadcasts and in government channel videos of select agricultural topics and workshops. AES actively engages our stakeholders also through on-farm research projects.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Other (Individual, direct contacts from the community)

Brief explanation.

Individuals and groups are identified through farmers' organizations, active members of the farming community and stakeholders approaching us for advice.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Other (Clients contact AES with specific requests)

Brief explanation.

Through listening to our stakeholders at previously described activities through which we interact and recording their input.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Research Programs

Brief explanation.

Information is gathered and reviewed. If the issues identified by the stakeholders can be directly resolved with the present AES focus and fund allocation, it is handled by the program within AES. If outside expertise is needed, other Land Grant programs are contacted. Issues that require multiple years are developed into a grant proposal for funding.

Brief Explanation of what you learned from your Stakeholders

The stakeholders needs in the US Virgin Islands are very diverse. New farmers have multiple questions and concerns that established farmers have resolved. The stakeholders have been very supportive of AES and have seen the benefit to the community. AES is respected for working on and resolving the issues of our limited resource stakeholders.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1166661	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	351323	0
Actual Matching	0	0	173054	0
Actual All Other	0	0	0	0
Total Actual Expended	0	0	524377	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agronomy - Mixed Cover-Crop Livestock Systems

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			10%	
204	Plant Product Quality and Utility (Preharvest)			20%	
205	Plant Management Systems			40%	
302	Nutrient Utilization in Animals			15%	
307	Animal Management Systems			15%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.0	0.0
Actual Paid	0.0	0.0	1.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	15882	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	7823	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research project
Present data at conferences
Publish results in scientific journals
Conduct local seminars and regional workshops

2. Brief description of the target audience

The target audience consists of local and regional farmers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Abstracts presented at conferences

Year	Actual
2014	1

Output #2

Output Measure

- Articles published in scientific journals

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcomes will be measured by the number of local farmers that utilize cover crop technologies in mixed crop-livestock production systems and the number of farmers who use the tested cover crops for soil improvement and as livestock forage.

Outcome #1

1. Outcome Measures

Outcomes will be measured by the number of local farmers that utilize cover crop technologies in mixed crop-livestock production systems and the number of farmers who use the tested cover crops for soil improvement and as livestock forage.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tropical smallholder farmers that operate under low external input (LEI) conditions often have integrated agricultural systems that include different combinations of agronomic, horticultural, and livestock interests. Relationships between multiple discipline agriculture that include cover crop technologies are complex and in need of further study. Cover crops are crops planted during fallow periods in between cash crop rotations to provide a variety of ecosystem services. These services include serving as a soil cover to reduce soil erosion, serve to increase soil quality, increase biodiversity, and provide alternative pest management to decrease pest populations in subsequent crop rotations.

What has been done
Sunn hemp (Crotalaria juncea) was planted in monoculture and in polyculture with sunflower (Helianthus annus) and sesame (Sesamum indicum). The purpose of the comparisons between the sunn hemp monoculture and polyculture cover crop plantings is to determine effective monoculture seed planting rates for sunn hemp monocultures compared to polyculture planting to maximize cover crop biomass. It is also necessary to determine proper termination time for cover crop polycultures based upon plant maturity and physiology. Cover crop polycultures in tropical climates need to be evaluated to determine optimal termination strategies.

Results
Due to the late start of the project in 2014, research is still being conducted and results will be compiled after cover crop trial completion. Preliminary results indicate that sunn hemp planting densities need to be significantly reduced from monoculture seeding rates. Optimum monoculture seeding rates for sunn hemp when used as a cover crop range from 35 to 45 lbs per acre. At this rate light penetration of the canopy is effectively reduced eliminating or severely reducing weed development within the sunn hemp monoculture. At this rate it is feasible to produce 7 to 9 tons

per acre of vegetative biomass. Sunn hemp is highly competitive and drought tolerant and will outcompete sunflower and sesame at higher planting rates. Therefore, in polyculture, it is recommended to reduce sunn hemp seeding rates to 10 to 15 lbs per acre when planted with sesame and sunflower.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Due to the late start in plant establishment for the project, results have not yet been obtained.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Animal Science - Beef Cattle

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals			20%	
303	Genetic Improvement of Animals			20%	
306	Environmental Stress in Animals			20%	
307	Animal Management Systems			20%	
312	External Parasites and Pests of Animals			20%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.6	0.0
Actual Paid	0.0	0.0	1.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	51766	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	25497	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct research
- Publish results
- Present data at conferences
- Collaborate with other members of multistate project

2. Brief description of the target audience

Beef producers in the tropics, greater Caribbean, Central and South America and the southern US.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Because of administrative and scientific meeting conflicts of the Director/Faculty no abstracts were presented at conferences for this activity.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

Using tick burdens as a selection criteria in Senepol cattle

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Ticks are of concern because they are a disease vector and can have a negative impact of herd productivity. They also impact the ability of producers to move animals within and off the island during sales. Current control methods consist of regular dipping or spraying with acaricides to control tick burdens on cattle which is an expense in materials and labor. If animals with natural resistance to ticks could be identified then their use in breeding programs could decrease tick burdens through genetic selection.

What has been done
This study was conducted to evaluate the relationship of tick load between multiparous Senepol cows (n = 127 observations) and their calves (n = 144 observations). Calves were born in fall 2010 and 2011 and spring 2011, 2012, 2013 and 2014. Cow tick load (clean, light, moderate and heavy) was measured at weaning. Calf BW and tick load were measured at weaning and at yearling. Average daily gain (ADG) was calculated for birth to weaning and weaning to yearling.

Results
There was no effect of calving season or cow tick load on 365-d adjusted weight of calves. There was no effect of cow tick load on calf ADG from birth to weaning. Calves of cows with light tick loads had lower ADG from weaning to yearling than calves of cows with clean, moderate or high tick loads (0.29 ± 0.02 vs. 0.49 ± 0.03 vs. 0.45 ± 0.03 vs. 0.44 ± 0.03 kg/d, respectively). Spring-born calves had greater tick loads at weaning than fall-born calves (2.3 ± 0.1 vs. 1.5 ± 0.2, respectively) but there was no difference as yearlings. Calves of cows with high tick loads at weaning had lower yearling tick loads than calves from cows with clean, light or moderate tick loads (1.4 ± 0.3 vs. 2.1 ± 0.3 vs. 2.5 ± 0.2 vs 2.1 ± 0.3, respectively). Cow tick load at weaning had low correlations with calf tick load at weaning (r = 0.24) and at yearling (r = -0.23). Calf tick load at weaning was not correlated with tick load at yearling (r = -0.01). Cow tick load does not affect calf tick load or pre-weaning growth. Because of the low correlation of tick load between

cows and calves, and within calves, it may be difficult to select for this trait in Senepol cattle very effectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
306	Environmental Stress in Animals
307	Animal Management Systems
312	External Parasites and Pests of Animals

Outcome #2

1. Outcome Measures

Breeding Senepol heifers at 1 year of age

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Breeding heifers at a year age has been shown to increase lifetime productivity because cattle in the USVI are grass fed they tend to grow slower than in temperate areas and have later reproductive maturity. Sexual maturity of bulls and heifers is a critical component of an efficient cattle operation.

What has been done
This study was conducted to evaluate growth of Senepol bull and heifer calves from birth to a year of age using calves born in spring of 2012 (n = 11 heifers and 10 bulls) and 2013 (n = 17 heifers and 16 bulls). Hip height (HHT) and BW were measured at weaning and yearling. Pelvic area (PA) of heifers and scrotal circumference (SC) of bulls were measured at yearling. Average daily gain (ADG) was calculated from birth to weaning and weaning to yearling.

Results
Bulls had a greater 205-d adjusted weaning weight than heifers (242 ± 6 vs. 217 ± 6 kg, respectively) but there was no effect of year. Bulls had a greater ADG from birth to weaning than

heifers (0.96 ± 0.03 vs. ± 0.83 ± 0.03 kg/d, respectively) but there was no effect of year. Weaning HHT was greater in bulls than in heifers (111.5 ± 0.7 vs. 108.3 ± 0.7 cm, respectively) and greater for calves born in 2012 than in 2013 (111.9 ± 0.8 vs. 107.8 ± 0.6 cm, respectively). Bulls had a greater 365-d adjusted yearling weight than heifers (293 ± 7 vs. 268 ± 7 kg, respectively) but there was no effect of year. Calves born in 2012 had lower ADG from weaning to yearling ($P < 0.004$) than calves born in 2013 (0.28 ± 0.02 vs. 0.37 ± 0.02 kg/d, respectively) but there was no effect of sex. Bulls had greater yearling HHT than heifers (118.8 ± 0.7 vs. 115.4 ± 0.7 cm, respectively) and calves born in 2013 had greater HHT than those born in 2012 (118.9 ± 0.6 vs. 115.2 ± 0.7 cm, respectively). Yearling SC of bulls was not different between years (24.7 ± 1.3 vs. 24.4 ± 0.9 cm, respectively). The PA of heifers was not different between years (145.5 ± 7.7 vs. 136.4 ± 5.5 cm2, respectively). These data show that there are differences in the growth traits between Senepol bull and heifer calves reared under tropical conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

Due to low animal numbers and limitations of the breeding program (pasture space) yearling heifers were not bred at this time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

It may be difficult to select for tick burdens because of the low relationship of tick burdens between cows and calves. Senepol cattle growth traits through a year of age were evaluated and shown to be different between bulls and heifers. Further studies will be done to evaluate breeding potential of heifers at a year of age.

Key Items of Evaluation

Low correlation of tick between cows and calves will make it difficult to select for this trait.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Animal Science - Small Ruminants

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
303	Genetic Improvement of Animals			10%	
306	Environmental Stress in Animals			10%	
307	Animal Management Systems			50%	
313	Internal Parasites in Animals			30%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.6	0.0
Actual Paid	0.0	0.0	1.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	66717	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	32860	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct Research Experiments
- Publish results
- Present data at conferences

2. Brief description of the target audience

The target audience is hair sheep producers in the tropics and the southern US.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Abstracts presented at conferences

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers using late weaning of hair lambs

Outcome #1

1. Outcome Measures

Number of farmers using late weaning of hair lambs

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Hair sheep in tropical areas can be managed in an accelerated lambing system that produces 3 lamb crops every 2 yr. After weaning lambs are fed a concentrate ration or placed on pasture. Both methods of rearing weaned lambs are suitable to local conditions but each has its own risks and limitations. Feeding lambs a concentrate ration is expensive and the return on the investment is minimal. Young lambs on pasture are more susceptible to parasite infestations and death loss. Crossbreeding local breeds with Dorper can result in increased rates of gain and size of lambs produced. Weaning lambs at a later age may provide a way to mitigate the costs and further take advantage of the greater growth rate of crossbred lambs.

What has been done
The objective of this study was to evaluate the impact of weaning St. Croix White and Dorper x St. Croix White lambs at 63, 90 or 120 d of age on gastrointestinal parasite burden of ewes and lambs. St. Croix White (STX; n = 19) and Dorper x St. Croix White (DRPX; n = 27) ewes were assigned to treatment groups at lambing based on breed, age, number and sex of lambs. Treatments consisted of weaning lambs (n = 67) at 63 (n = 24), 90 (n = 21) or 120 (n = 22) d of age. At 63, 90 and 120 d of age all lambs were weighed, scored using FAMACHA system and fecal egg counts (FEC) and packed cell volume (PCV) were measured. All ewes were sampled when their lambs were 63, 90 and 120 d of age. Lambs and ewes were treated with an anthelmintic if they had a FAMACHA score of 4 or greater. Data were analyzed using GLM procedures of SAS with treatment and breed as main effects. FEC was transformed using log10(FEC + 1) before analysis.

Results
Weaning weight of lambs weaned at 120 d was heavier than lambs weaned at 90 and 63 d (17.8 ± 0.7 vs. 13.3 ± 0.7 vs. 10.5 ± 0.6 kg, respectively) across breeds. FAMACHA score was greater in DRPX than in STX lambs (2.3 ± 0.1 vs. 1.8 ± 0.1, respectively). There was no difference in

PCV or FEC between DRPX and STX lambs (32.7 ± 0.4 vs. 30.7 ± 0.4 %, and 1,468 ± 214 vs. 1,518 ± 240 eggs/g, respectively). Weaning age had no effect on FAMACHA, PCV or FEC in lambs. There was no effect of breed or treatment on ewe body weight. There was no difference in FAMACHA or PCV between DRPX and STX ewes (2.7 ± 0.1 vs. 2.4 ± 0.1 and 27.9 ± 0.4 vs. 27.3 ± 0.5 %, respectively). The DRPX ewes had greater FEC than STX ewes (998 ± 175 vs. 170 ± 231 egg/g, respectively). There was no effect of weaning age on FAMACHA, PCV or FEC of ewes. Weaning hair lambs later than 63 d of age resulted in heavier lambs at weaning, but there was no effect on parasite burdens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
306	Environmental Stress in Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

Droughts can impact forage levels, hurricanes can destroy facilities and disrupt production cycles.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Late weaning of lambs can be done in an accelerated lambing system and there is no impact of parasite burdens of lambs.

Key Items of Evaluation

Late weaned lambs increase efficiency of the flock by decreasing the amount of feed needed. Parasite burdens are not affected by weaning age, and this may be due to the resilient genetics of the local breeds of sheep.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Plant Biotechnology and Breeding

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms			40%	
202	Plant Genetic Resources			20%	
204	Plant Product Quality and Utility (Preharvest)			40%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	71114	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	35026	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research project
Develop efficient micro-propagation systems
Present data at conferences
Develop fact sheets for the local population
Publish results in scientific journals

2. Brief description of the target audience

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Articles in scientific journals

Year	Actual
2014	1

Output #2

Output Measure

- Abstracts submitted

Year	Actual
2014	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of local farmers growing micro-propagated sweet potato and hybrid papaya

Outcome #1

1. Outcome Measures

Number of local farmers growing micro-propagated sweet potato and hybrid papaya

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.

What has been done
Varieties of sweet potatoes have been maintained in vitro as virus - free stock material. The 12 in vitro sweet potato varieties were established in a field plot along with local varieties. From these clean stock plants, replicated trials were conducted on harvest date to control weevil damage. Harvested sweet potatoes were evaluated post-harvest at three storage temperatures and soluble sugar content determined weekly over time. Selected papaya lines were bred to maintain seeds. Fruits were selected based on size, color, disease tolerance and yield.

Results
Farmers and backyard gardeners had access to virus - free sweet potato vine cutting for use in establishing their plots. UVI field trials indicated that harvest at 90 - 120 resulted in clean harvestable sweet potato tuberous roots with less than 10% marketable loss due to sweet potato weevil damage. Harvests after 130 to 150 days resulted in over 50% loss of marketable yield due to sweet potato weevil damage. Sugar content of harvested sweet potatoes is low ~5-8% soluble solids. However, curing one week at room temperature followed by storage at 65F results in soluble sugar content between 12 and 18%. Compact papaya lines were selected that produce fruit 1Kg in size with a soluble sugar content over 10% brix. Seeds were cleaned and dried and made available to the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area

201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Other (Fed certification of transgenics)

Brief Explanation

Weather conditions in October and November delayed field preparation due to excess rain.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Virus - free sweet potatoes grow more vigorously and result in higher yields. Over the course of the year, the virus - free stock plant accumulated virus.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Biotechnology and Agroforestry - Plant Germplasm Evaluation and Conservation

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources			50%	
205	Plant Management Systems			50%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	12118	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	5968	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research project
Present data at conferences

Develop fact sheets for local growers
Publish results in scientific journals

2. Brief description of the target audience

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Articles in scientific journals

Year	Actual

2014	0

Output #2

Output Measure

- Abstract presented

Year	Actual
2014	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of local farmers growing selected plant varieties

Outcome #1

1. Outcome Measures

Number of local farmers growing selected plant varieties

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sorrel or rosella is a seasonal grow of great importance during the holiday season. However, during the establishment and growth through the rainy season, the plants are susceptible to Fusarium wilt disease from excess water. This disease can completely destroy a growers crop. Disease tolerant or resistant lines need to be found. Ginger used in the Virgin Islands is imported but no information is available for local production of this tropical crop. System needs to be developed to evaluate the potential for growing ginger in the Virgin Islands.

What has been done
Sorrel varieties were evaluated from germplasm obtained from the USDA, Caribbean and local cultivars. Varieties ranged from wild material to advanced commercial lines. Varieties were grown in replicated trials on farmers plots where the Fusarium disease has been devastating. Ginger was established on calcareous soils at 8" and 12" spacing. Pre-emergent herbicide was used for weed control during establishment. Harvest began in December and continued at two week interval to February.

Results
Certain sorrel varieties are very susceptible to the Fusarium wilt disease and are the first to become infected and die. All sorrel eventually succumbed to the disease but varieties were found that produced a harvestable yield. Ginger requires a year to grow and mature prior to harvest. In mid December, ginger plants start to die down. By late January, all the foliage had dried. No significant difference was found between plant spacing or among harvest date.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

205 Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

The Fusarium disease in the farmers' field provided an evenly distributed disease pressure on the plants along with the heavy seasonal rains which kept the soil saturated. The calcareous soils caused chlorosis in the ginger which was corrected with bimonthly applications of FeEDDHA.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Sorrel varieties were found with tolerance that delayed the Fusarium in the sorrel plants to allow for harvestable production. Very susceptible varieties will be eliminated from seed collection and distribution. FeEDDHA can be used on calcareous soils to control iron chlorosis. When the ginger naturally goes dormant in December, it can be harvested and no increase in yield is obtained from allowing the crop to have the foliage die back through February.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Horticulture and Aquaculture - Aquaponic systems

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems			50%	
307	Animal Management Systems			25%	
403	Waste Disposal, Recycling, and Reuse			25%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	65262	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	32159	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research project
Provide training
Present data at conferences
Publish results in scientific journals

2. Brief description of the target audience

The audience for this research consists of local farmers as well as national and international farmers, entrepreneurs, researchers, extension agents, development workers and teachers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Abstracts presented at conferences

Year	Actual
2014	1

Output #2

Output Measure

- Journal articles

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of new farmers anywhere adopting aquaponic technology

Outcome #1

1. Outcome Measures

Number of new farmers anywhere adopting aquaponic technology

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Interest in aquaponics is expanding rapidly on a global level. Aquaponics maximizes land use, recycles and conserves water, minimizes soil disturbance, recycles scarce nutrients, and produces a high valued protein source that in turn supplies nutrients to a comprehensive organic vegetable production system. Due to the growth of the vegetables in a soilless environment, the incidence of pests is greatly reduced which increases food quality and decreases pesticide use. Aquaponics systems are currently being maximized around the world and are of particular interest in tropical regions.

What has been done
Evaluated production of leafy green vegetables in the commercial aquaponic system that included kale, collards, Swiss chard and pak choi. Evaluated regrowth yields of sweet basil. Evaluated different foliar application concentrations of calcium and phosphorus on yield of zucchini.

Results
Due to changes in research program leadership, results are currently being compiled and analysed. Results will be presented in future seminars, workshops, professional conferences, and in publications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Results are still under analysis.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Horticulture and Aquaculture - Irrigation

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water			40%	
205	Plant Management Systems			20%	
405	Drainage and Irrigation Systems and Facilities			40%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	18339	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	9033	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research projects
Present data at conferences
Publish results in scientific journals

2. Brief description of the target audience

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Abstracts presented at conferences

Year	Actual
2014	0

Output #2

Output Measure

- Articles published in scientific journals

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers adopting irrigation strategies based on soil moisture
2	Knowledge of fertigation and chemigation use in vegetable crop production

Outcome #1

1. Outcome Measures

Number of farmers adopting irrigation strategies based on soil moisture

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The "Challenge of the 21st century" will be coping with water scarcity according to the Food and Agriculture Organization of the United Nations (FAO, 2013) Much effort will be required to meet food and freshwater demands for future global populations. Fresh water is presently a scarcity in the US Virgin Islands since there are no flowing rivers, lakes, or reservoirs and municipal water is derived from costly desalination of sea water. The US Virgin Islands also has an extended dry season that lasts for six months of the year and severely limits agricultural production. Rain water harvesting is the primary means of collecting water for agricultural use. Microirrigation is the most efficient use of water for crop production and the use of fertigation has potential to increase crop production and water use efficiency.

What has been done
During 2014, an extensive effort was undertaken to refurbish and establish a commercial scale rainwater harvesting, catchment, storage, and irrigation distribution system for research and demonstration purposes. This facility consists of a 2 acre rainwater catchment area, a storage pond, five 30,000 gallon storage tanks, pumps, and related infrastructure necessary for sustainable crop production on approximately 5 acres utilizing micro irrigation technologies.

Results
Research is currently being conducted to evaluate the application and efficiency of this facility on various cropping systems. Results will be analysed and presented to local farmer stakeholders, at professional conferences, and utilized within professional publications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

205	Plant Management Systems
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Knowledge of fertigation and chemigation use in vegetable crop production

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers access to fresh water for irrigation is presently a scarcity in the US Virgin Islands since there are no flowing rivers, lakes or reservoirs. The US Virgin Islands also has an extended dry season that lasts for six months of the year and severely limits agricultural production. Fertigation is the most efficient use of water for crop production and the use of fertigation has potential to increase crop production and water use efficiency.

What has been done
An extensive effort was undertaken to refurbish irrigation distribution system for research and demonstration purposes for sustainable crop production on approximately 5 acres utilizing micro irrigation technologies.

Results
Research is currently being conducted to evaluate the application and efficiency of fertigation on various cropping systems. Results will be analysed and presented to local farmer stakeholders, at professional conferences, and utilized within professional publications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
205	Plant Management Systems
405	Drainage and Irrigation Systems and Facilities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Using fertigation incorporated into drip irrigation systems is an efficient method of even distribution of water soluble nutrients to the growing crop plants.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Horticulture and Aquaculture - Vegetable Crops

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships			10%	
202	Plant Genetic Resources			40%	
205	Plant Management Systems			30%	
213	Weeds Affecting Plants			10%	
216	Integrated Pest Management Systems			10%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.0	0.0
Actual Paid	0.0	0.0	1.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	50125	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	24688	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research
Present data at conferences
Publish results in scientific journals

2. Brief description of the target audience

The target audiences are the local crop farmers and back yard growers. These producers normally have less than two acres under production. The Virgin Islands has only three producers with total production acreage over two acres.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Abstracts presented at conferences

Year	Actual
2014	1

Output #2

Output Measure

- Publications in scientific journals

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Selection of pest and disease resistant cultivars

Outcome #1

1. Outcome Measures

Selection of pest and disease resistant cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Current economic development strategy in the U.S. Virgin Islands (USVI) aims to enhance horticulture production through sustainable methods in order to meet local demands of horticultural commodities. Vegetables are important commercial crops for producers within the USVI and are grown for fresh market. Consumers have begun to give more consideration to the vegetables due to nutritional benefits and popularity because of their high levels of vitamins and minerals. 2007 Census of agriculture for the US Virgin Islands indicates that production has decreased in many vegetables such as tomato, eggplant, okra, cabbage, squash, lettuce etc. since 2002. Geographic position, limited production and declining economy have considerable constraints for the economic development and vegetable production in the USVI. Quality and production of vegetable crops has affected severely due to high production cost, spread of soil borne diseases and pests, natural disasters, superior varieties, weeds. Cultivar trials are an important tool for increasing production efficiency, therefore, the objective of the proposed research project is to observe improved cultivars of selected vegetables for yield, quality, weed control and adaptability in the local soil and climatic conditions of the US Virgin Islands. Any improvement in these economically important crops by applying modern scientific techniques will directly affect the quality of life of the farmers and overall population of the community.

What has been done
Vegetable variety trials for snow pea, sugar snap pea, and butternut squash were conducted during the 2014 growing season. Snow pea (Pisum sativum L. var. saccharatum) and Snap pea (Pisum sativum L. var. macrocarpon) are high value vegetables typically grown in temperate regions. Three cultivars of Snow pea; ?Oregon Giant?(OG), ?Mammoth Melting?(MM), ?Little Sweetie?(LS), and three cultivars of Snap pea; ?Cascadia?(CA), ?Sugar Sprint?(SS), and ?Super Sugar Snap?(3S) were grown at the University of the Virgin Islands, Agriculture Experiment Station, St. Croix, US Virgin Islands. The experimental design was a complete randomized block consisting of six cultivar treatments with four replications. Prior to planting, trellises were

constructed by stretching 1.5 meter tall plastic mesh fencing between metal posts at 3 meter intervals. Peas were hand planted on Feb 4, 2014 in double rows with individual peas spaced at 7.6 cm and rows spaced at 1 meter for a total of 262,466 plants/ha. Peas were micro-irrigated daily based upon soil moisture and fertigated weekly at a rate equivalent to 67 kg/ha nitrogen using a commercial 20-20-20 fertilizer.

Results

Results from the snow pea and sugar snap pea variety trials indicate that There was no difference in germination rate observed between cultivars (89-93%). Data on total, marketable and non-marketable pod yield were collected bi-weekly for a total of 10 harvests. Plant height and Brix% measurements were collected during the growing season. The snow pea cultivar LS produced the highest total fruit yield for the season across all cultivars at 14,306 kg/ha ($p<0.0002$). Of the three sugar snap cultivars tested, 3S yielded 9,042 kg/ha which was greater than CA, MM and SS ($p<0.05$), but similar to OG. Non-marketable fruit for LS was 1,691 kg/ha which was similar to OG, MM, and 3S, but greater than CA and SS ($p<0.01$). However, non-marketable fruit for LS represented 12 percent of the total harvest which was similar to all other cultivars, except MM (27% non-marketable fruit). Fruit Brix% was similar for SS, 3S, CA, and OG at 11.0, 11.0, 10.8, and 10.2, respectively, while all three sugar snap cultivars had higher Brix% than MM and LS at 9.8 and 9.5, respectively ($p<0.05$). The snow pea cultivar LS was higher yielding, but had the lowest Brix% content. The sugar snap cultivar 3S had acceptable fruit yield and had equally as high Brix% as the other sugar snap cultivars. Results of this experiment indicate that both sugar snap and snow pea varieties have potential as a specialty high value crop when grown in the cooler months on St. Croix.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Results from the butternut squash trial indicate that all varieties had similar total yield (JW 7,294; TA 7,040; HN 6,529; WM 6,390; PM 5,626; NB 5,301; MO 5,296 kg/ha) except for BB (2,833 kg/ha) (p-value?). HN had the highest sugar content at 11.7 °Bx. NB, JW TA, WM, and MO had the highest fruit weights (444, 429, 427, 417, and 409 g) (p-value?). Results indicate that all varieties except BB have potential as a high value vegetable crop for St. Croix, USVI.

Key Items of Evaluation

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.