

1981-1982 REPORT

Agricultural
Experiment
Station

Cooperative
Extension
Service



COLLEGE OF THE VIRGIN ISLANDS

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The year 1982 brought special recognition to land-grant programs at the College of the Virgin Islands when the director was named the recipient of India's highest award for agricultural research. Dr. Darshan S. Padda received the prestigious Rafi Ahmed Kidwai Award which is given every two years by the Government of India for his "outstanding work in agricultural research."

Since Dr. Padda could not attend the award ceremony in India, arrangements were made for him to receive the award in person from the Indian Ambassador in Washington, D.C. In addition to the handsome medal pictured, Dr. Padda also received a written certificate of citation.



FROM THE DIRECTOR

This is the second printed report of the Land-Grant programs at the College of the Virgin Islands. It covers the research and education activities carried out for the two year period of 1981 and 1982. Significantly 1982 marks the first decade of land-grant status granted by U.S. Congress in 1972.

A perusal of this report reflects growth in all programs and the chart presents the growth in clientele served from 1972 to 1982. I am very pleased with the growth as the ultimate goal of our research and educational activities is to provide Virgin Islands residents with research-based information so that they can cope with and benefit from changes in technology, societal factors and ecology.

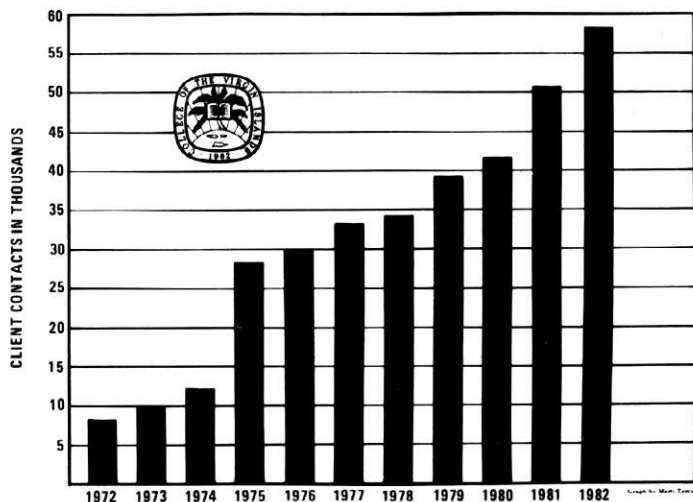
At the end of 10 years it is logical to look back and analytically assess whether the expectations have been met. But whose expectations? My personal expectations - yes and no. Yes, because the programs have expanded: the Agricultural Experiment Station is established as a small but effective research station with projects in agronomy, horticulture, pest management, plant pathology, irrigation technology, animal science and aquaculture. An AA degree in agriculture is functioning with the appointment of the first assistant professor of agriculture. The Cooperative Extension Service has offices functioning on all three islands. For the first time in the history of the islands, there is a modern computerized soil, plant and water diagnostic laboratory on St. Thomas. New home economics and pest diagnostic laboratories on St. Croix are providing much needed services to homemakers and farmers.

Whereas in the areas of both technology development and extension education performance has been impressive, these efforts must result in the development of an agriculture industry. And here is where I have to say no to the fulfillment of my expectations. There is a definite improvement, but the pace is slow. However, recent initiatives by the Virgin Island government are encouraging and we can only hope that things will move faster in the future so that we can help Virgin Islanders grow more food with new technology and research-based information.

In the meantime let us be proud of the great accomplishments resulting from the hard work of the dedicated people of the Land-Grant programs and continuously be mindful that our goal must be to develop a viable agricultural industry in the islands.

I wish to urge the community at large to use the locally developed information contained in this report and call upon us for any assistance that we can provide.

GROWTH OF LAND GRANT PROGRAMS



APPROXIMATE NUMBER OF CLIENT CONTACTS MADE BETWEEN 1972 AND 1982
BY COLLEGE OF THE VIRGIN ISLANDS LAND GRANT PROGRAMS
(COOPERATIVE SERVICE AND AGRICULTURAL EXPERIMENT STATION)

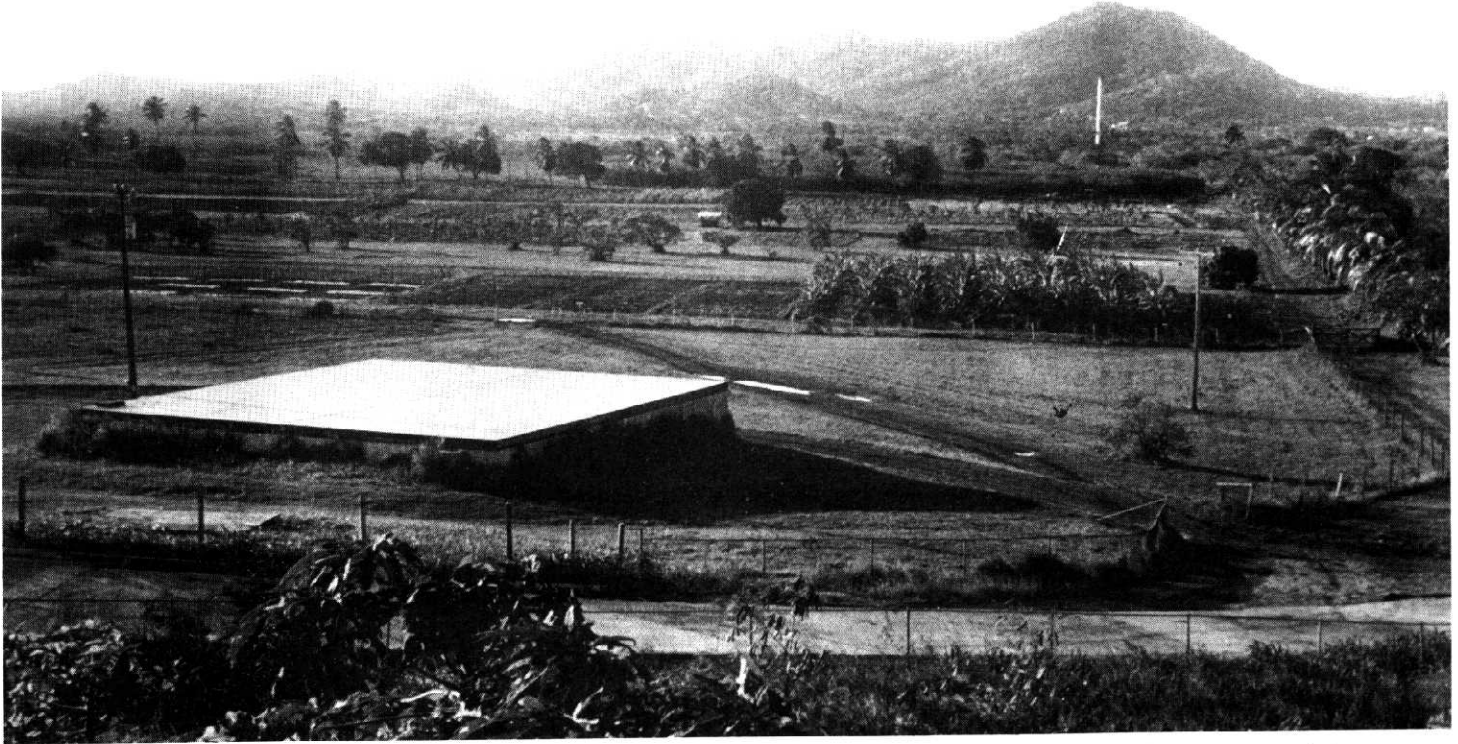
Enjoyable and informative reading to all.

Darshan S. Padda
Director,
Land-Grant Programs



The St. Croix campus of the College of the Virgin Islands originally was centered around this historic building at Estate Golden Grove which today serves as extension headquarters as well as housing the community and rural development program and extension communications. Some evening college classes are also held in its classrooms. The handsome old structure was once the main estate house for vast sugar plantations of St. Croix's central valley which were processed in nearby Bethlehem refinery.

AGRICULTURAL EXPERIMENT STATION



Partial view of Agricultural Experiment Station fields used for varietal trials of field crops. Water storage cistern for irrigation shown in foreground.

Research projects in food and agricultural sciences continued to expand in the four basic areas of the Agricultural Experiment Station -- Agronomy, Animal Science, Aquaculture and Horticulture. The Agronomy program placed its emphasis on research in the production of animal feed for livestock and poultry, with field experiments conducted on grain and forage crops which can be useful to the local farmer. Evaluation of the Senepol cattle under Virgin Island conditions has been the main feature of the Animal Science program

and efforts of the Aquaculture program continue in the development of practical culture systems for tilapia that are adapted for home production in the Virgin Islands. Research projects in determining the best varieties and production practices for local conditions were the main thrust of the Horticulture program. Particular consideration was focused on trials of food crop varieties to select those which withstand heat and drought as well as destructive pests.

AGRONOMY - Crops for Feed and Food

The agronomy program has continued intensive research into animal feed crops which can provide increased protein for cattle and at the same time withstand insect and bird predation as well as low rainfall levels. The main areas of concentration have been in grain crops (sorghum and corn), forage legumes and tropical grasses. A preliminary study also investigated the feasibility of sunflower production in the Virgin Islands.

Sorghum

Forty commercial varieties of grain and forage sorghum were field tested in 1980-1981 for adaptation and agronomic characteristics. Pioneer variety 8815 (grain type) produced the highest yield of 1678 kg per acre. Among the forage sorghum varieties, top producers were S-99 with 24.66 metric tons per hectare yield and Sweet Sioux which yielded 22.41 metric

tons per hectare. Local growers have indicated their main interest is in forage sorghum and trials conducted in 1981-82 indicated that T-E Hay Grazer was the best overall adapted forage variety out of 15 varieties used in two experiments at the station. In other experiments to determine the best planting time, production and quality as animal feed, Hay Grazer was found to be a multi-purpose cultivar that can be well utilized for grazing, hay, green chop, green manure, or as a cover crop. Other forage sorghums which excelled were Sugar-Su-D, a dry matter high yielder, and both T-E Milkmaker and T-E Silomaker which were the highest fresh yielding. In grain sorghum production trials, indications were that T-E Dinero was the top producer, with other varieties suffering severe damage from birds which caused a decrease in production. Studies on insect control revealed that Lanate and Dipel (biological insecti-



Haygrazer proved to be a good multipurpose sorghum cultivar for grazing, hay, green chop and green manure.

cide) were effective in controlling webworm, corn earworm and fall armyworm.

Legumes

In November 1980 and March 1981 tests for adaptation to soil and climatic conditions were initiated on four types of legumes -- commercial Siratro (*Phaseolus atropurpureus*), Lablab (*Lablab purpureus*), Jackbean (*Canavalia ensiformis*), and cow peas (*Vigna spp.*). Other objectives were to test their resistance to pests and disease, and their quality as dairy and cattle feed. Investigations were also continued on the soybean *Nionotonea* (formerly *Glycine*) *wightii*. Field observations indicated that *N. wightii* is well adapted to St. Croix soils and climate. Based on this observation and previous work by the agronomy program, *N. wightii* can be recommended for pastures on the sections of the island receiving the most moisture and Lablab can be recommended for the drier areas. Recommended to farmers as a remedy for feed shortages during the dry season is a mixture of Buffel grass and Siratro. Jackbeans are also well adapted to soil and dry climate, and have proven to do well on calcareous soils which cover so much of the islands.

Grasses

Klein grass (*Panicum coloratum*), Guinea grass (*Panicum maximum*), and Love Weeping grasses were evaluated as promising grasses for pasture, hay and

silage, and research was continued on Buffel grass (*Cenchrus ciliaris*) and Rhodes grass (*Chloris gayana*). Measurement of soil pH, available nutrients in soil, crude protein percent, grass palatability and utilization were recorded. While the local livestock industry depends on forage and pastures mainly, studies made over a two year period have shown that introduced grasses such as Buffel, Klein, Love Weeping, Bahia, Blue Stem and common Bermuda were much higher in total digestible nutrients (TDN up to 40%) than primary local forage grasses. Observation data also suggests that Guinea grass and Klein grass were the best adapted and gave higher yields, with an average of over 6.72 metric tons per hectare depending on fertilizer rate and source.



Introduced grasses such as Loveweeping contain up to 40% more total digestible nutrients than local forage grasses.



Recommended to local farmers to augment feed during dry seasons is Buffel grass (shown) mixed with the legume Siratro.

Sunflower

Trials with seven Dahlgren varieties of hybrid sunflower (*Helianthus annuus*) were begun in March 1981. The oil varieties included Do164, Do704x1, Do844, Do843-35 and Do705. The non-oil varieties were D820 and D135. The objectives of this sunflower introduction trial were to evaluate crop yield, resistance to drought and seed quality. The recorded data showed that oil and



Hybrid sunflower trials in 1981 suggest that the sunflower could be grown profitably in the Virgin Islands for either oil or seed, with an approximate yield of 4000 pounds of seeds per acre.

non-oil varieties were similar, with an approximate yield of 4.48 metric tons of seeds per hectare. Field observations and yield data suggest that sunflower could be grown profitably in the Virgin Islands.

Corn

In studies conducted in 1980-1981, commercial corn cultivars TE Blanco and TE 6975 produced top grain yields of 4931 and 4758 kg/ha respectively. Pesticide effectiveness studies on field corn (*Zea mays*) conducted in conjunction with Pest Management specialists to control mites, fall armyworm and corn earworm, revealed that Kelthane, Insecticidal Soap and Basic H gave the best control of mites, while Lannate was most

effective against armyworm and earworm.

JoJoba (*Simmondsia chinensis*)

An investigation on the introduction and feasibility of JoJoba crop production in the V.I. was initiated on November 29, 1981. Seeds were planted by hand and were placed about three (3) cm below the surface of wet soil (water holding capacity). The seeds of broadleafed evergreen JoJoba contain a liquid and solid wax in addition to alcohols. The residues can be used as an animal feed supplement and fertilizer (due to high nitrogen content). Preliminary field observation indicated that the crop is well-adapted to the V.I. environment and the possibility of a JoJoba oil industry exists when more uncultivated land is planted with this crop.



Senators Edgar Isles (left) and Bent Lawaetz stop by the sorghum fields to check out the latest feed crops with AES agronomist Dr. Ahmed Hegab.

VEGETABLES - Varieties Suited for Our Islands

The primary research effort in vegetable production has been to select and evaluate varieties of locally adapted crops for home consumption and commercial production. Yield performance, quality, and resistance to pests and diseases are the major evaluation criteria. Vegetable field experiments included variety evaluations, optimum plant density, fertilization rates and methods to correct soil alkalinity.

Tomatoes

Three different trials were conducted with tomatoes. The first experiment (January to April 1981) evaluated four varieties (Royal Chico, Saladette, Tropic and Super Beefsteak) using the ground planting system without trellis or supporting stakes. Royal Chico proved to be the best in estimated marketable yield with 20.6 tons per hectare, while Tropic, Super Beefsteak and Saladette gave marketable production of 9.5, 7.2 and 5.9 tons per hectare, respectively. A second experiment was conducted from August to October 1981 to observe the performance of heat-tolerant tomatoes from the

Asian Vegetable Research and Development Center in Taiwan. Royal Chico, used as the control, outyielded all of the AVRDC heat-tolerant varieties. The third evaluation trial from February to May was conducted with staked tomato varieties. Of fourteen cultivars tested, Winner, Red Glow and UHN-69 produced the highest yields.

Eggplant

Evaluation trials on eggplant were conducted for two seasons. The first trial with eight cultivars was started in August 1980 and the second trial with the best five cultivars from the first trial was started in the field during the first week of July 1981. In both seasons eggplant varieties Midnight and Peerless were the highest yielders. A ratooning experiment, wherein the old plants were cut back about six inches from the ground and allowed to grow back, proved Midnight and Peerless again the most productive. It was further observed that the ratooned crop produced approximately 17 percent lower yield than the first or primary crop.

Beans

A variety evaluation and planting date trial was conducted with nine snap bean cultivars and one string bean cultivar. The string bean variety (*Los Banos bush sitao*) out-yielded all the snap bean varieties; Oregon 4117 and Contender were the most productive snap beans. Evidence from the study indicated that on St. Croix beans perform better when planted during the wetter months of the year. In a sulfur and micronutrient study on snake beans (*Vigna sequepedalis*), also called bodie beans, one objective was to release elements made unavailable to the plants due to high soil alkalinity. The other objective was to improve the nutrient status of the soil by application of the deficient elements, with snake beans used as indicator plants because of their apparently high sensitivity to micronutrient deficiencies. Preliminary results showed that the highest yields were obtained from plots applied with chicken manure (44 tons per hectare) in combination with iron, manganese and copper all at a rate of 2.2 kilograms per hectare and from those plots which received an application of 4.5 tons of sulfur per hectare combined with chicken manure, manganese and iron at the same rates.

Okra

Because okra is a very popular vegetable in many local dishes and is grown extensively in local home gardens, an okra variety evaluation trial was conducted comparing Emerald Green and Clemson Spineless, two



Jefferson, an okra cultivar from Arkansas, proved to be a much higher yielder than two other grown frequently in the islands.

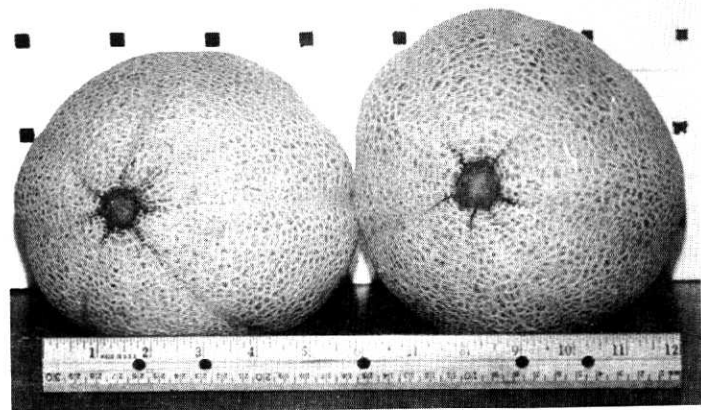
commonly grown island varieties, with Jefferson, a recently developed okra cultivar from Arkansas. The results indicated that Jefferson cultivar yielded 55 percent higher than Emerald Green and 85 percent higher than Clemson Spineless. In a fertilizer rate and population density study of Clemson Spineless, six plant densities were considered (72,000, 43,000, 36,000, 27,000 and 18,000 plants per hectare). Highest yields were obtained with 36,000 plants per hectare. In the fertilizer rate study using 10-10-10, the highest yield was obtained with application of 560 kilograms per hectare.

Other Investigations

Four varieties of onions were tested for yield performance. Results indicated that short-day onion cultivars Granex 33 and Texas Grano 502PRR out-yielded Inca (long day) and Pronto (intermediate) under Virgin Islands' conditions. Planter's Jumbo cantaloupe was tested for the influence of phosphorus applied at rates of 0, 25, 50 and 100 kilograms per hectare. Plants receiving 25 and 50 kilograms per hectare increased yields averaging 11,000 and 14,000 pounds per hectare respectively while those treated with 0 and 100 kilograms per hectare only produced yields of 8,000 and 10,000 pounds of marketable fruit respectively.



Granex 33 onion cultivar proved the best in yield tests conducted of four varieties.



Application of phosphorous at 50 kilograms per hectare increased yields of Planter's Jumbo cantaloupe dramatically.

Thirteen sweet potato varieties from Louisiana Sweet Potato Center and 18 varieties of two species of yam (*D. alata* and *D. rotundata*) were propagated and initial observations begun on their agronomic characteristics; three breeding lines of sweet potatoes specifically developed for weevil resistance in South Carolina were propagated and studies begun on their weevil resistance under tropical conditions. Investigations of horseradish trees (*Moringa oleifera*) for growth and yield performance were initiated since these trees contain edible pods and leaves high in protein. Studies were also initiated on two species of luffa (*Luffa acutangularis* and *L. cylindrica*) which grow well in the Virgin Islands and whose pods can be used as a nutritious vegetable when green and for sponge production when mature. Thirty-six breeding lines of cassava from CIAT, Columbia, along with four sweet cultivars from Puerto Rico, were planted to be multiplied and characterized in ongoing studies of this popular starchy West Indian staple crop.



The horseradish tree (*Moringa oleifera*) produces leaves and edible pods high in protein. Investigations were initiated for growth and yield of this easily grown island tree.



Tamarind School had an agriculture apprentice program with AES for older students such as this one shown learning more about vegetable science from Dr. Adriano Navarro.



Luffa (*Luffa acutangularis*), much in demand as a natural bath sponge, is a vine which grows prolifically in the tropics and can be cultivated as a vegetable similar to squash if picked when young.

FRUITS - To Enrich Our Diets

The main emphasis in fruit crop research has been directed towards ongoing studies of bananas, citrus, avocado, sapodilla (mesple), and pineapple, with work continuing on the St. Croix papaya decline disease.

Banana

A study was completed on the evaluation of nematocidal use on local cassava intercropped with Cavendish banana. Cassava sticks were planted in April and harvested in November. It was found that Mocap 10%G (Granular) treated plots at 84g per banana plant yielded the highest amount of intercropped cassava roots (4.5 kg per plant) and Dasanit 15%G yielded the lowest (2.7 kg per plant.) Cassava intercropped with banana plants receiving cattle and poultry manure yielded 3.9 kg per plant while plants receiving 10-10-10 fertilizer at 0.85 kg per plant yielded 2.3 kg per plant. An

outbreak of mites on the cassava was controlled with two sprays of Kelthane EC but there was no infestation of banana plants, with the cassava providing excellent windbreak control for the bananas. Cooking tests revealed that slightly earlier harvesting of the cassava would have minimized the woody nature of the cooked roots.

The Cavendish banana, a large, sweet banana which is popular with customers, can be susceptible to soil infestation by nematodes. An experiment to evaluate the effects of three nematicides, Diazinon 2E and differing rates of fertilizer has been conducted since March 1980. Preliminary findings showed that the nematicide treated plants produced healthy plants and suckers. Wind toppled plants occurred mainly in the control and Diazinon treated plots. Ammonium sulphate and



Chicken manure and nematicide Furadan combined to produce bananas yielding more than 50 pounds per bunch.

poultry manure fertilizers appeared to have the greatest effect on plant growth. In the second year, yield data for the plants receiving fertilizer revealed that chicken manure (5.5 kg per year) treated plants produced 20.6 kg per bunch. Plants receiving ammonium sulphate (1.4 kg per year) yielded 18.3 kg per bunch and those receiving 10-10-10- (2.8 kg per year) yielded 17.1 kg per bunch.

The best average bunch yield (22.8 kg) from combined fertilizer/nematicide treatments resulted from chicken manure and Furadan 5%G (20 grams per plant). Plants receiving a double rate (2.8 kg) of ammonium sulphate per year showed the highest leaf tissue nitrogen of 2.4% but these did not correspondingly give higher yields.

A varietal trial of 30 plants each of the well-known commercial cultivars Giant Cavendish, Robusta and Valery was initiated to evaluate performance under local conditions. Sword suckers were obtained from WINBAN in St. Lucia. Chicken manure at 5.5 kg per plant was incorporated in the planting hole and Furadan 5%G at 20 grams per plant was applied at planting. Plants were drip irrigated. In July 1982 the first flowering plants were Giant Cavendish (10%) at an average height of 1.6 meters. Thus far, percentage survival is 60% for Giant Cavendish, 53% for Robusta and 43% for Valery. Also initiated in October 1981 was a germplasm collection of local banana and plantain cultivars including Giant and Dwarf Cavendish, Dwarf Lacatan (*Musa sp. AAA*), Tall and Dwarf Horse Banana (*Musa sp. ABB*), Tall and Dwarf Plantains (*Musa sp. AAB*), and Bacuba (*Silk Fig, Apple Banana, Musa sp. AAB*). The objectives of this collection are to observe the performance of all local banana and plantain material to see what improvements can be made on selections already in use by farmers; to make selections of promising material for future field trials under varying fertilizer, cultural and water levels; and to document growth and fruiting habits of cultivars which have thus far been only of minor importance.

An intercrop trial was initiated in December 1981 combining Tall type Horse banana (also called Bluggoe,



Tissue cultured plantain were drip irrigated after being transplanted to the field. Survival rate in September 1982 was 100%.

Malango or Moko--Musa sp. ABB) with local West Indian papaya, and Dwarf type Horse banana with Solo Sunrise papaya. Plots of eight banana plants at 1.9m x 3.2m spacing were interplanted with papaya in inter-row areas. Severe leaf yellowing of banana plants in certain areas of the field has been corrected by applying Fe Sequestrene 138 at 28 grams per plant. Sporadic outbreaks of Mosaic and Ring Spot virus occurred in papayas, but so far no evidence of St. Croix papaya decline disease has been noted.

Introduction of the first batch of tissue cultured plantain plantlets made it possible to evaluate a new method of banana and plantain propagation which will allow the farmers to acquire unlimited amounts of pest-free planting material quickly, easily and at a relatively low cost. A 75% survival of both the Dwarf and regular Maricongo Plantain plantlets was obtained and 2½ months after arrival from the laboratory, plants were transplanted to the field. All plants were drip irrigated using potable water. Chicken manure was incorporated in the planting hole (5.5 kg per plant) at time of transplanting. To test control of nematodes and corm borers applications of Furadan 5%G at 20 grams per plant every four months, Temik 10%G at 45 grams every six months and Diazinon 2E two tablespoons per gallon applied to each plant every two months were made to plots of 6 plants spaced at 1.9m x 3.2m. A field evaluation of plants in September 1982 revealed a 100% survival rate.

Avocado

The evaluation of fruiting characteristics of selected varieties of avocados continued for a second year with data compiled on both early bearing types (July-October) and late bearers (December-March). Information was recorded on fruit and seed size, pulp color and texture, and skin thickness. The present avocado orchard was originally established in 1955 at the experiment station site. Two varieties of early bearers far exceeded the late bearing trees in terms of size with DWI Bank weighing 540 grams and Butler weighing 431 grams. The largest late bearers were Booth 7 (377 grams) and Lula (299 grams).

Sapodilla

The fruiting characteristics of nine local and introduced Sapodilla (Mesple) varieties are being evaluated. Recorded data include time of flowering and fruiting, yield, time of ripening, fruit size, color, texture, taste and number of seeds. Variety Russel produced the largest fruits (195 grams), followed by Boetzberg (188 grams), Jamaica-10 (183 grams) and Morningstar (155 grams).

Citrus

In June 1980 a variety trial of 20 citrus varieties on two rootstocks was initiated on a 0.42 hectare field. Plants were spaced 6.5m between rows and 4.9m between plants on 15 cm raised beds which were mulched with dried grass. The objective of this trial is to

observe performance of various citrus cultivars on different rootstock so as to select the best scion and rootstock combination for local conditions. The establishment of the orchard will also serve as a valuable germplasm collection from which scion material can later be obtained. Several of the varieties which were affected with Foot Root disease (*Phytophthora sp.*) showed good response to drench treatments with the systemic fungicide Ridomil (1.5 milli-liters per gallon). After two years growth, eight citrus varieties had a 100% survival. Among these are Navel orange, Blood orange, Temple orange, Ponderosa lemon, all on Sour orange rootstock; also Pineapple orange, Blood orange, Orlando tangelo and Persian lime on Cleopatra mandarin rootstock. Eighty percent survivors included Parson Brown orange, Marsh grapefruit and Thompson Pink grapefruit on Sour orange rootstock, and Murcott orange and Kumquat on Cleo mandarin rootstock.

Pineapple

An experiment to study the effects of three mulch types on Red Spanish pineapple was initiated in December 1980. Used in the experiment were a silver-coated plastic, black plastic and cut grass. During the first year all three mulch treatments effectively controlled weeds of which the most persistent was wild poinsettia (*Euphorbia heterophylla*). However, during the second year plants were severely affected by mealy bug infestation and heart rot disease. Although application of



A mulch experiment on Red Spanish pineapple conducted over a two-year period revealed black plastic the best, with 62% surviving.

Malathion checked the spread of mealy bugs, heart rot proliferation was rapid and uncontrollable. Black plastic-mulched plants treated with a combined spray of ammonium sulphate (100 kg per hectare) and iron sulphate (10 kg per hectare) had the biggest survival rate of 62%, with 75% flowering in the summer of 1982. Completely unmulched plants performed most poorly, with almost the entire treatment lost to mealy bug and heart rot. Silver coated plastic-mulched plants grew well until the plastic biodegraded and completely disintegrated one year after planting. Pineapples mulched with cut dried grass performed second best and those that were also treated with the ammonium sulphate/iron sulphate fertilizer combination showed a survival of 25% with 50% of those flowering.

Tropical Fruit Collection

A 0.84 hectare orchard of local tropical fruits particularly adapted to the soil and climatic conditions of St. Croix was begun in 1981. So far selected varieties of West Indian Cherry, Guava, Black Sapote, Sugar Apple, Custard Apple, Soursop and Jackfruit have

been planted. Planned future additions to the collection are: Jujube, Governor plum, West Indian plum, Golden apple, Star apple, Gooseberry, Malay apple, Mamee sapote, Breadfruit and Breadnut.

Ornamental Project

Christmas Snowflakes (*Euphorbia leucocephala* Lott), also called Snow on the Mountains, was evaluated as a potential Christmas pot crop using two growth retarding compounds. Seedlings transplanted in May 1981 were repotted to ½ gallon containers in August and the soil was drenched with chemical growth retardants in October. Although Cycocel at 3000 ppm produced the most attractive potted plants, Anacymidol at 0.5 active ingredient per pot produced a 37% reduction in plant size (height + width) and induced four times more cyathia (flower² inflorescences) over the control plants. If this scheduling of potting and chemical application is followed, potted Christmas Snowflakes plants are at their best appearance by December 15 in time for the Christmas season.

IRRIGATION - For Dry Weather

The irrigation program at the experiment station has as its main objective the investigation of crop response to irrigation and to provide basic information necessary for proper irrigation water management of tropical crops.

Requirements for Dry Season Tomatoes

An area of 0.06 hectares was planted with UH N-69 tropical hybrid tomato on December 7, 1981. Each plot consisted of three rows of 12 plants spaced at 0.45 x 1.22 meters. The irrigation treatments on split-plot design were Consumptive Use (CU) ration 1.25, 1.00, 0.75, and 0.50 (main plot) and one and two days frequency (sub plots). The treatments were replicated three times. The trickle irrigation system consisted of Bi-Wall 19 tubing with orifices at 44 cm x 160 cm buried at 8 cm. The system included a volumetric valve, pressure regulator, 200 mesh filter and two water meters for each treatment.

Before transplanting, 20 liters of chicken manure and 100 kg per hectare of superphosphate were incorporated in each row. Side dressing with a complete fertilizer was applied twice monthly after fruit set. Foliar fertilizer with major and trace elements was applied as nutrient deficiency symptoms developed. Weeds were controlled with Dacthal herbicide and additional manual and mechanical cultivation. Leafminers, fungus and bacterial diseases were controlled by integrated pest management techniques. By periodically monitoring insects and diseases the pesticide treatments were reduced by 60% compared to a standard weekly schedule.

Tomatoes were harvested twice a week from February 5, 1982 to March 23, 1982. The greatest response to



55,054 kg per hectare of tomatoes were harvested in March 1982 utilizing specific irrigation techniques.

irrigation, with 55,054 kg per hectare of marketable tomatoes, was obtained with 1.00 CU ratio applied every other day. The unmarketable yield averaged under 10%. Statistical analysis is to be continued on plant height, fruit size and irrigation water efficiency.

Research results show that by using multiple disease and heat resistant hybrid tomatoes such as UN N-69, along with trickle irrigation scheduling techniques to maximize yield per unit of water applied, it is possible to obtain high marketable yields (55,054 kg/ha) and top quality tomatoes in the U.S. Virgin Islands. Cultivar UH N-69 yields were 2.6 higher than yields obtained in 1978-1979 trials and 15.6 times higher than tomato trial

yields in 1980-1981 conducted at the Virgin Islands experiment station.

Effect of Irrigation on Watermelon

Previous research on Charleston Gray and other oblong watermelon varieties in the Virgin Islands shows that yields were severely reduced by the development of blossom-end rot. Inadequate irrigation was suspected to be the reason. In an experiment begun on April 1, 1982, Charleston Gray seeds were planted in an area of 0.04 hectares. Cultural techniques employed were similar to those of earlier experiments. Eight irrigation treatments replicated three times were applied to determine the effect of irrigation on watermelon growth and quality. The irrigation system (trickle) included Bi-Wall 19 tubing buried at 8 cm and a volumetric valve, pressure regulator, 200 mesh filter and two water meters for each treatment.

Field observations show that the following factors appeared to have reduced the watermelon yield considerably: a.) inadequate pollination because of the small number of bee visits per hour to each flower; b.) severe attack of fungus and anthracnose despite the supposed disease resistant qualities of Charleston Gray; c.) severe blossom-end rot in all of the plots. The level of calcium in the soil was optimum and tissue analysis has indicated average to high calcium.

The results indicate that for adequate bee pollination, bee colonies should be brought into the area of watermelon production. Plastic mulch is required and only highly disease resistant watermelon varieties should be considered for use in the Virgin Islands.

Effect of Irrigation on Papaya

Irrigation studies were initiated for the first time in the Virgin Islands on reaction of papaya which is susceptible in the islands to the St. Croix decline disease. An area of 0.07 hectares was planted with PR 6-65 papaya on June 26, 1982. Plants were spaced 1.82 meters in a row, 1.82 meters between rows and 3.64 meters between double rows. Plants are in a split-plot arrangement with four irrigation amounts in main plots and two frequencies in the subplots. Each subplot consists of six plants, three each from two adjacent rows, but data is being taken only from the two central plants of each plot. Treatments are replicated three times.

The irrigation system consists of on-line 3.7 liter per hour emitters (one per plant) and a volumetric valve, pressure regulator and two water meters for each treatment. Rain catchment water is filtrated by 200 mesh filter. Superphosphate was incorporated in the 50x50x50 centimeter holes before transplanting. Nitrogen is applied twice a month and fertilizer with trace elements applied as nutrient deficiency symptoms developed. Pesticides were sprayed weekly to prevent the development of St. Croix decline disease and anthracnose.

Early findings in this continuing irrigation study are that the decline disease has affected only the weak papaya plants representing approximately 8% of the total in the first few weeks after transplanting. Weekly treatments with Kocide before blossoming seem to control the disease and field observations show that papaya responds well to irrigation.



Checking water pressure regulator on irrigation system.



Split plot arrangement of irrigated young papaya plants -- the first such study in the Virgin Islands.

PEST MANAGEMENT - Alternative Control Methods

A chief emphasis of the experiment station Pest Management program has been to characterize significant pests on priority crops and to develop and apply effective alternatives to synthetic chemical pesticides. One major aim is to achieve efficient control of diseases and insect pests under tropical island conditions, but at the same time insuring that unnecessary pesticide applications are avoided. Another aim is to recognize that while pesticides will necessarily be a component of any pest management effort, it is important to develop and implement an appropriate pesticide storage, use and handling system as well as a safe disposal process.



In a joint research project with the vegetable science program, sweet potatoes were evaluated for resistance to weevil infestation.

Inter-region Cooperation

In an example of inter-regional cooperation, the Pest Management program joined Inter-region Project 4, a nationwide effort with other U.S. experiment stations to gather data necessary for the clearance of pesticides for use on minor crops including tropical fruits and vegetables. The program also joined a project sponsored by the InterAmerican Institute for Cooperation in Agriculture (IICA) of the Pan-American Health Organization which is concerned with the incidence of Bluetongue virus, a disease of sheep, goats and cattle transmitted by the biting fly, *Culicoides*. A presumed outbreak of Bluetongue on St. Croix was investigated by Dr. Paul Gibbs, associate professor of Virology at the University of Florida School of Veterinary Medicine, who also held a seminar for livestock producers on viral diseases of livestock.

Sabbatical Aids Local Studies

During a five-month sabbatical leave, Dr. Roger Bland from Central Michigan University conducted basic and applied studies that included a comprehensive assessment of the crop pests and their natural enemies for beans, cabbage, cantaloupe and corn; evaluations of the efficacy of a range of insecticides and miticides with emphasis on low hazard products such as insecticidal

soap; laboratory bioassays using a natural repellent and feeding deterrent derived from the tropical neem tree (*Azadirachta indica*) against melonworms; and field trials on baits for control of ants that tend aphids. Eight detailed reports resulted from this work.

Joint Projects in Research

A paper entitled "Integrated Pest and Irrigation Management Research on Tomatoes in the Virgin Islands" was presented at the 18th Annual Meeting of the Caribbean Food Crops Society in Barbados in August 1982. A joint research project between the irrigation and pest management programs resulted in a standardized survey form, protocol for assessment and recommendation for treatment which are being applied presently to a tomato pest management scouting service by the Cooperative Extension Service. Other research projects undertaken were weed control in tomato, cantaloupe and beans; evaluation of sweet potato weevil resistant germplasm; and control of mites on sweet corn.

Comprehensive recommendations on tropical crop groups, coordinated with those from Puerto Rico and Florida, were submitted to the Office of Pesticide Programs of the U.S. Environmental Protection Agency in response to a proposed standardized crop grouping scheme published in the Federal Register. Many crops and their uses in tropical regions were not properly represented in the original proposal and this comprehensive response was to redress this imbalance.

A cooperative research agreement with the U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) involving field trapping and monitoring of two of the world's most serious insect pests, the tomato fruitworm and the pink bollworm, was completed on St. Croix. These two insects were the object of genetic sterility research at the St. Croix USDA-ARS field station. Among other findings, it was determined that these insects can be effectively controlled by genetic means. No migration between St. Croix and neighboring islands was detected.

St. Croix Papaya Decline Disease

In continuing efforts to seek a solution to the St. Croix papaya decline disease syndrome, various treatments and trials have continued throughout the past two years at the experiment station. In one, the effects of sulphur treatment and soil fumigation using methyl bromide were tried. Although plants in the methyl bromide treated plots started more vigorously, their overall growth and performance were far below those of the control plots. Yields were lower, fruits were smaller and incidence of decline symptoms were more severe. It was also evident that effects of methyl bromide fumigation are very temporary and in the end are a counterproductive and impractical method for controlling the decline disease. The application of sulphur did not have



A variety trial of 24 papaya cultivars was begun to determine resistance to St. Croix papaya decline disease.

any significant effect on soil pH and therefore does not appear to be an effective means of lowering the pH in local soils.

A variety trial of 24 cultivars to observe natural resistance to St. Croix papaya decline disease involved accessions from the Virgin Islands, Puerto Rico, Hawaii, Costa Rica and Florida. There were 13 harvests starting in February 1981. Results were not conclusive, and although complete resistance was not found in any cultivar, field tolerance was shown by some entries and individual plants.

A significant advance was achieved in Spring 1981 when a possible breakthrough towards a solution of the decline was achieved with the isolation of an *Erwinia* bacterium as a major contributing causal organism by Dr. Milton Schroth, professor of bacteriology at the University of California. Research is continuing on this papaya decline disease problem.



Papaya plant exhibiting characteristics of decline disease.



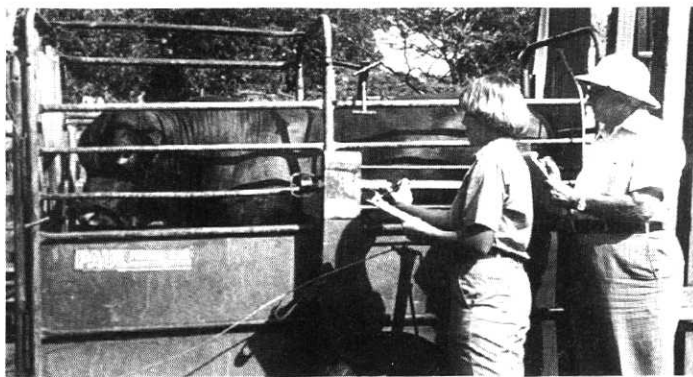
Dr. Roger Bland, entomologist and biology professor from Central Michigan University spent a six-month sabbatical with the AES pest management program investigating crop pests in the Virgin Islands. He takes time out to snap a photo of the colorful "frangipani worm."



Renowned scale insect specialist Dr. Michael Kosztarab of Virginia State University was a visiting scientist with the pest management program where he verified the identity of locally collected specimens.

ANIMAL SCIENCE - Assisting the Beef Industry

The main emphasis of the Animal Science program has been to evaluate Senepol cattle under their native Virgin Islands environment. This is a unique program in that all experimental units are derived from cooperating Senepol breeders' cattle operations. Collecting and processing data from six Virgin Islands breeders and four mainland cooperators has been greatly improved through the use of a microcomputer. The on-the-farm performance testing program data management is now processed in a timely fashion. Considerable time was spent adapting data handling programs to the new computer system from the various systems previously used.



Animal Science Research Assistant assists local beef cattle producer grade and weigh Senepol for on-the-farm performance testing program.

On-the-Farm Performance Tests

Data collected from on-the-farm performance testing of Senepol beef cattle includes birthdate, sire, dam, weaning weight and age, postweaning weight and age, measurement variables and breed characterization variables. Measurement and breed characterization variables are evaluated at weaning (7-9) months and at postweaning (a year for bulls and 18 months for heifers). Measurement variables include length from withers to the anterior lumbar, hip height, and length from hooks to pins. Breed characterization variables are head condition and shape, bumps, sheath evaluation, body condition, frame, color and temperament. Weaning performance data taken at 7-9 months were adjusted to a 205 day weight standard. Summary reports include adjusted weights, weight ratios and cow efficiency. Postweaning weights were adjusted to a 365-day weight (1 year) for bulls and a 540-day weight (18 months) for heifers. During this time data was taken on 1152 cows/calf pairs, 121 mature bulls and 979 postweaning calves per year.

From 1977-1979 two computer services were used for processing records. These systems were incompatible for data transfer to the existing microcomputer. Therefore, all of the 10,000 collected records are being re-entered into the present system. Records from 1980 to present were entered as collected.



Animal Science Research Technician in cooperation with V.I. Consumer Services conducts a meat quality and meat cutting workshop for local meat marketers and other interested persons.

Two cooperators have breeding records from 1954 to 1976. These records will be used to determine the genetic relationship and history of the breed. Of the 51,000 records, all have been tabulated for data entry and editing. However, only about 10% have been actually keypunched for analysis.

Effect of Feed

A grain-on-grass feeding experiment involved feeding level (pasture only and 3 levels of grain on grass) and feeding length (140 & 168 days on feed) utilizing 112 bulls at two locations. As expected, preliminary analysis suggests the average daily grain and final weight were augmented as a result of the increase in number of days on feed and the amount of feed provided.

Sixty-one bulls were slaughtered with carcass data and Warner Bratzler shear data collected. There were no interactions between feeding time and feeding level for all variables observed. Color, texture and the four Warner Bratzler shear (tenderness measurement) values were unaffected by location, feeding time, or feeding level. Feeding time had a significant effect on live weight (410 kg), cold carcass weight (234 kg), ribeye area per body weight (2.02 cm/cwt.), backfat (.11 cm), yield



Cowboy directs St. Croix Senepol cattle out to pasture after collecting data and performing routine management duties.

grade (1.75) and age (486 days). Location and feeding level had a significant effect on live weight, cold carcass weight, ribeye area per cwt, backfat, dressing percent (56.9%), marbling score (3.3) and conformation (9.9).

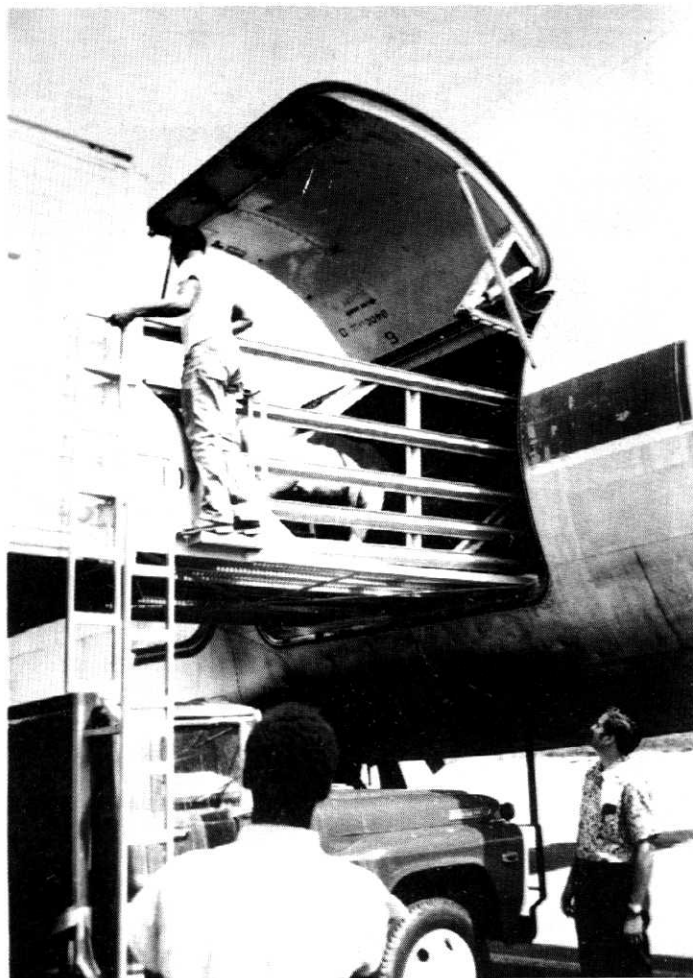
Milk Production Trial

The second year of a milk production trial utilizing the weigh-suckle-weigh technique, utilized 24 cow/calf pairs at one location conducted over a 10 month period. Cow-calf pairs were put on a sampling schedule within 2 weeks of birth. Birth weights were taken within 36 hours of birth and averaged 345 ± 5.4 kg. Butterfat, total solids and solids-not-fat measurements were taken during the eight month lactation period. Preliminary results indicate cows averaged 533 ± 51 kg going on trial and 527 ± 59 kg coming off the trial. Calf weight averaged 218 ± 21 kg when at an average of 202 ± 10 days of age. Results of the first milk composition sample made within two weeks after birthing showed 2.8% butterfat and 10.6% total solids; sample results taken when the calf was seven months old showed that butterfat was 1.8% and total solids 11.1%. Cows averaged about 1134 kg of milk in a 201 average day lactation period. (Production figures have not been adjusted to standard dates.) All but one cow (17 years old) from the previous year's trial rebred and calved within a 12 1/2 month period. Combined data sets for the two year's trial will be analyzed for further information.

Collaboration with Other Agencies

In an effort to determine the general combining ability (genetic) of the Senepol and to determine how the purebred Senepol produce relative to various purebred and cross bred breeds, the research program collaborated with the Brooksville Research Station to establish the first continental purebred Senepol herd at the Florida Beef Research Station. At this station purebred and crossbred Senepol can now be compared directly with various British and Zebu purebred and crosses. This 18 month effort, with the animal science program serving as liaison between APHIS-VS, Florida and

Virgin Islands State Veterinarians and the Virgin Islands Senepol Association, culminated with the shipment of 44 purebred heifers and four purebred bulls on June 21, 1982 from St. Croix to Florida.



Hydraulic lift transfers Senepol cattle to aircraft for flight from St. Croix to Florida Beef Research Station in Brooksville. The experiment station animal science program on St. Croix was instrumental in expediting this research opportunity for the Senepol breed.

AQUACULTURE - A Possible Major Food Supplement

The Aquaculture Research program has been involved in three areas of research on the freshwater fish Tilapia; the study of tilapia cage culture in small freshwater ponds; the construction of a facility to study recirculating fish culture/hydroponic systems; and hatchery management techniques for tilapia fingerling production.

Fish Pond Research

An important problem was identified which can greatly influence fish culture in many Virgin Islands ponds. During excessive dry periods, pond levels recede and dense vegetation proliferates on the banks. When large rainfalls do occur, excessive runoff from adjacent

hills soon fill the ponds to capacity, and within two to four weeks after these rainstorms, oxygen depletions occur resulting from the submergence and subsequent decay of pond bank vegetation. The result is high mortality among the caged tilapia. To avoid this problem, pond banks that are exposed below the high water mark should be maintained relatively free of vegetative growth.

Feeding Pellets

A year-long feeding experiment was conducted to evaluate three commercial feeds (Purina and Sunshine Mills floating catfish pellets, and Central Soya sinking crumbles) and three feeding rates schedules. The feeding



New aquaculture research facility was begun in 1981 near the St. Croix campus with 28 tanks for breeding and fingerling production experiments.

rate schedules were 3% of body weight throughout the experiment; reduction from 5 to 15% of body weight based on time (time slide); and reduction from 5 to 1% based on weight (weight slide.) Purina feed produced 26% higher yields with time slide, which was the best feeding rate schedule.

As a result of poor water circulation through the cages causing low dissolved oxygen levels, 30 new cages were constructed with cage mesh increased in size from 6 mm to 19 mm.

A demand feeder was designed for feeding caged tilapia in freshwater ponds. The feeder stores about 6 kg of feed and is mounted on the cage top. Caged fish quickly learn to trigger the release of feed by swimming into a rod suspended from the feeder. Use of this automatic feeder has substantially reduced the labor required in feeding.



Newly designed automatic feeder for caged fish in ponds has reduced labor required in feeding.

New Research Facility

Construction of an aquaculture research facility was started early in 1981 on a .4 hectare site near the college enclosed by fencing, with water and drain lines established initially. A field laboratory building was constructed and work was begun on establishing 34 circular swimming pools ranging in size from 3.7 meters to 8.2 meters in diameter and 8,700 to 64,000 liters in volume to be used in tilapia fish hatchery experiments. Two ex-



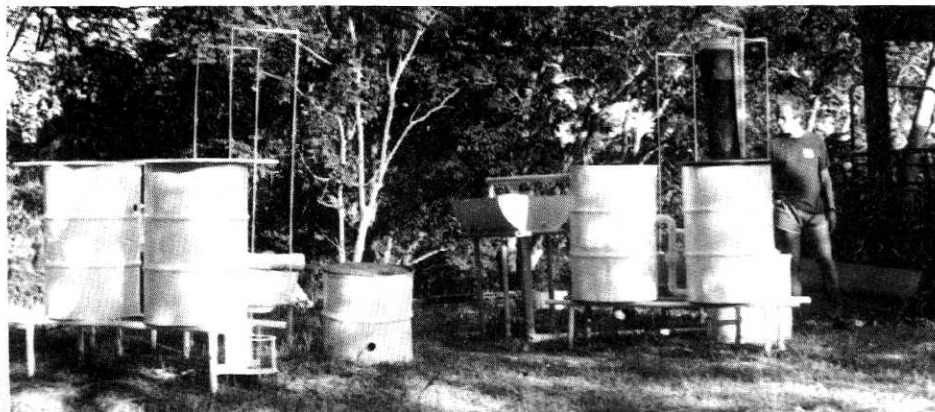
An experiment was conducted early in 1982 to determine effect of stocking density of brood fish on fry production. This small pan contains 500 tilapia fry.

periments were conducted in 1982. The first was to determine the effect of stocking density of brood fish (*Tilapia aurea*) on fry production. Results showed that total production of fry increased as stocking rates increased, but average production per female declined. The objective of the second hatchery experiment was to find the optimum stocking rate of fry in pools for rearing them to fingerling size. Tilapia fry were stocked in circular pools at six rates. Predation by dragonfly larvae caused wide variation in survival (59% average) and the results were therefore inconclusive. Future stocking should occur only in pools filled with water just prior to stocking, thus restricting development of dragonfly larvae populations. Three new species of tilapia received from the Tennessee Valley Authority in Alabama will be used in future experiments.

Recirculating Systems

One closed recirculating system was completed by September 1982 and five others were in various stages of construction. These systems consist of a 1,400-l rearing tank, a 1,900-l sludge settling tank, a 1,400-l reservoir, and two 2,300-l hydroponic tanks. The hydroponic tanks, 6 m long by 1.2 m wide and .3 m deep, each will hold almost 4.5 metric tons of gravel as a biofilter and substrate for vegetable culture. The design of the six recirculating systems is based on a small model that has been tested for two years. The model was constructed from four oil barrels, with three upright barrels used for fish culture, sludge removal and water storage, and the fourth cut in half horizontally and filled with gravel for biofiltration and hydroponic culture of tomatoes and lettuce. The system was powered by a small submersible pump. Total production in the first trial amounted to 9.5 kg of tilapia and 10.4 kg of vegetables over a four month period; in a second seven-month trial the small backyard model produced 11.8 kg of tilapia and 32.7 kg of lettuce and tomatoes. Since the model system was displayed to the public it has evoked keen interest and several individuals are now constructing similar systems for their own backyard use.

Freshwater fish such as tilapia may provide a greater portion of the protein intake in the diets of island people



Model fish culture-hydroponic systems served as prototypes for commercial scale recirculating systems currently under construction.



One 7-month trial produced 26 pounds of tilapia and 72 pounds of lettuce and tomatoes utilizing the small backyard fish culture-hydroponic system.



Marketing study in 1982 revealed that consumers would pay more than two dollars per pound for tilapia weighing an average of one pound.

who have heretofore relied heavily on marine fish because data gathered by the U.S. Fish and Wildlife Service has shown that near-shore marine fishery is exceeding the maximum sustainable yield. In a St. Croix retail fish outlet marketing study on public consumption of tilapia conducted in 1981, it was determined that consumers were willing to pay \$2.10 per pound for undressed fish weighing one pound. More than 200 pounds were sold during this brief study, with an added 175 pounds sold to the Bureau of Corrections. As a result of this study, aquaculture program personnel provided technical advice for the construction of a 0.08 hectare pond at the Golden Grove Adult Correctional Facility which will be used to demonstrate the principles of tilapia pond culture and will provide about 1360 kg of fish annually for inmates.

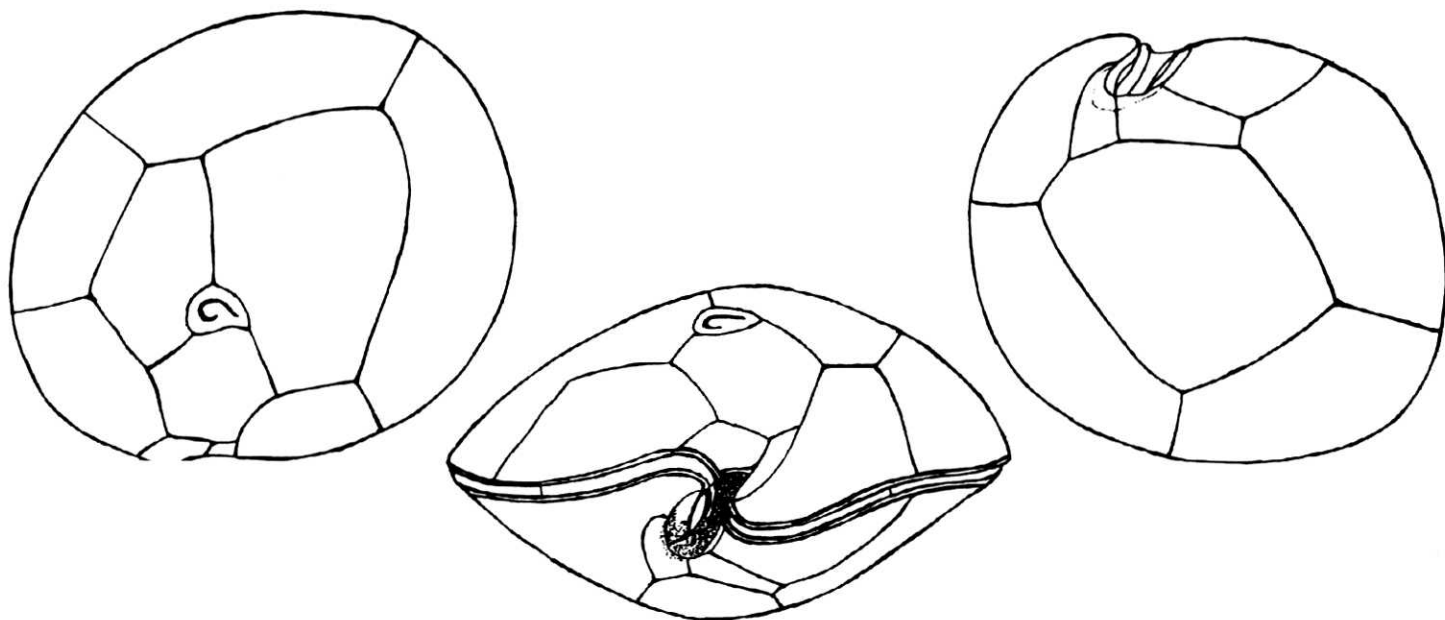
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Ciguatera Fish Poisoning Research

Ciguatera is a human affliction suffered when fish containing ciguatoxin (CTX) are consumed. CTX apparently originates in a micro-organism called *Gambierdiscus toxicus*, a dinoflagellate found in tropical oceans around the world, often on or near coral reefs. Laboratory studies of field-collected *G. toxicus* indicate it produces at least two toxins which cause the same symptoms as CTX from fish when tested in the mouse bioassay. The dinoflagellate toxins are probably altered biochemically as they are passed through the organisms along the food chain, ultimately becoming the CTX in

reef fish which poisons humans.

Everyone affected by ciguatera recognizes the need for a simple, reliable test for ciguatoxicity in fish. For a variety of technical reasons this goal has been extremely elusive. Recently, a chemical test has been undergoing development. Such a test is of great value for furthering our scientific understanding of the ciguatera problem. The test, counterimmunoelectrophoresis, is formidable technologically, as its name suggests, but it will hopefully lead to a practical, affordable test in the future.



A line drawing of *Gambierdiscus toxicus*, the dinoflagellate recently implicated in the biogenesis of ciguatoxin, taken from scanning electron micrographs. Alive, this micro-organism is 80 micrometers or 0.003 inches in diameter (after F.J.R. Taylor, University of British Columbia).

METRIC ABBREVIATIONS USED

millimeter	mm	kilogram	kg
centimeter	cm	granular	G
hectare	ha	meter	m
liter	l	gram	g

COOPERATIVE EXTENSION SERVICE

The years 1981 and 1982 could best be characterized as years of increasing teamwork as the four main program areas of the Cooperative Extension Service--Home Economics, 4-H Youth Development, Agriculture and Natural Resources, and Community and Rural Development--worked together to strengthen and support their mutual goals of serving as the informal educational outreach service of the College of the Virgin Islands. And as the extension programs expanded in terms of staff members, so also did the number of clients who were reached by these programs.

The network of interprogram cooperation could be found when a pest management extension agent served as leader of a new 4-H entomology club aptly called "The Stingers"; or when the Home Economics staff assisted in training counselors for 4-H summer camp and other island summer youth programs; or when Agriculture specialists showed housing project residents how to plant small gardens as part of a Home Economics community beautification program. Nor was extension's mutual support philosophy limited to its own agency, as staff members worked closely on special

projects with schools, the V.I. Department of Agriculture and the Agricultural Experiment Station.

Another keynote of the past two years was the increasing role all members of the staff played in providing workshops, seminars, classes, training sessions, community visits, meetings and personal home visits to persons needing the particular expertise that extension could offer. Residents on all three islands took advantage of opportunities to learn about grafting or air layering plants; how to care for sick livestock or improve milk production; when to spray for insect pests without jeopardizing beneficial insects; how much to fertilize; techniques for irrigating small garden plots; where to seek help in establishing a small business or buying farm acreage; how to stretch food dollars in a nutritionally balanced way; and methods for developing leadership roles with young people.

Increasingly, the role played by the Virgin Islands extension service has been one of cooperating with other island agencies in a wide variety of betterment projects; as a result, the word is out that extension is there to serve when called.

AGRICULTURE - Expanding Outreach to Farmers

Technical assistance to a greater number of farmers, growers and gardeners has been provided by the Agriculture Program by following three comprehensive program objectives. These included assistance in improving quality and increasing yields of food and feed crops; recommendations to livestock growers for improved management practices; and training private and commercial pesticide applicators. Contacts were made through traditional extension methods such as personal farm visits, office visits, seminars, workshops, guided tours, special classes and telephone communications.

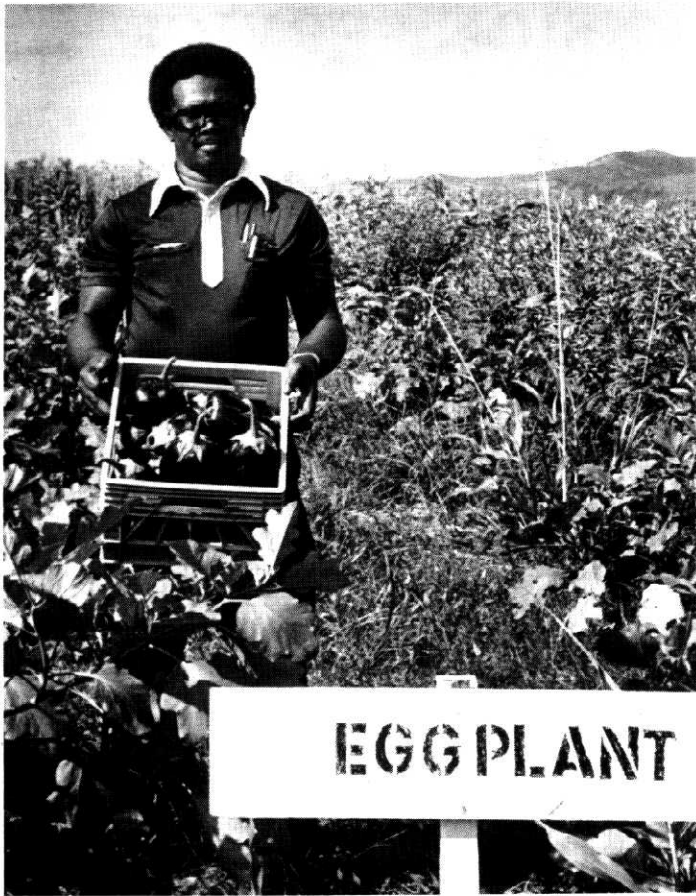
Horticulture

The addition of an extension horticulturist to the staff has enabled many fruit and vegetable growers in the three Virgin Islands to receive the technical assistance they have needed to correct production problems and receive guidance as well as motivation in the application of proper cultural practices. Pertinent information on vegetable and fruit varieties, irrigation practices, plant disease and pest management, and the best feed crop varieties based on research at the Agricultural Experiment Station is provided by the horticulturist and his staff. Changing traditional cultural practices for newer, more successful methods in some instances is met with resistance. Inducing selected farmers to use a new fungicide for control of root-rot and foot-rot on citrus, for example, was considered a positive breakthrough.

Continued food price inflation did much to stimulate the home gardening effort and new, first-time home



Visits to home gardeners and farmers provide an opportunity for Extension Agriculture staff to assess cultural practices throughout the islands. Former farmer-of-the-year Jose Torres (right) shows a heavily laden banana plant to extension horticulturist Clinton George.



Basic crops were grown in demonstration gardens opposite St. Croix Campus utilizing varieties recommended by experiment station scientists.

gardeners continued to increase over former years. Information was sought most frequently on best locally adapted varieties, fertilization, planting practices, augmenting water supplies and crop protection.

Educational activities included tropical fruit workshops and seminars which attracted 593 participants who learned about propagation by air layering, grafting, cutting and budding. Mangoes, papayas, bananas, avocados and citrus have been the most popular fruits traditionally with increased interest expressed in plant-



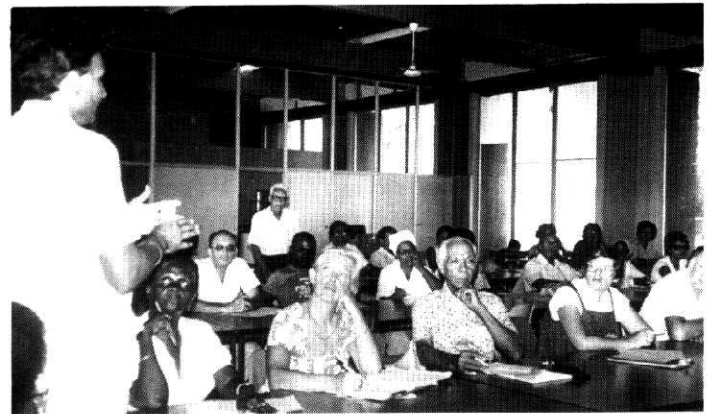
Workshop participant prepares his citrus plant for grafting.

ing sapodilla (locally known as mesple), sugar apple, custard apple, soursop, West India Cherry, guava and local plums.

Vegetable workshops were attended by a total of 550 growers with stress placed on emphasizing techniques that are applicable to local conditions. Among these are time of planting and using proven varieties which are more adaptable to heat, drought and the myriad of insects and diseases which plague crops year round in the tropics. Predominant crops grown locally are tomatoes, okra, pigeon peas, eggplant, peppers, collard greens, local spinach, cucumbers and pumpkins. A staple for many residents is the "ground provision" group which includes cassava, tannia, yam and sweet potato.



Proper shelter for goats is illustrated by guest speaker at extension Saturday workshop.



Extension director Darshan Padda addressed St. Croix gardeners who attended five-day Agriculture Short Course.

Workshops and seminars were attended by the relatively small group who are full-time farmers along with part-time farmers and home gardeners, teachers and others who are new to the islands and are exploring the possibility of augmenting their diets with locally grown produce.

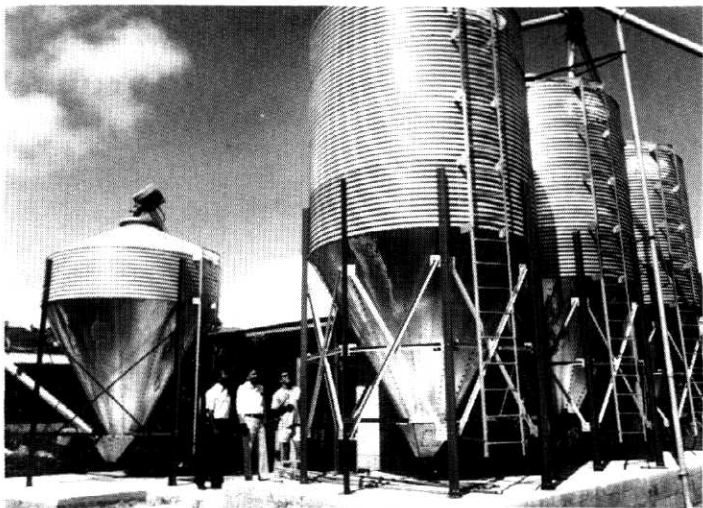
The first World Food Day observance was conducted by extension, with 500 tomato seedlings and cultivating instructions distributed to the public. To assist housing project dwellers improve the appearance of their project, a seminar was held for 18 residents of Paradise Mills on growing small gardens. Fourteen families enrolled in the program and planted flowers and vegetables around their dooryards.



Graduation day concludes a five-session Agriculture Short Course held jointly with V.I. Teachers Corps for interested St. Croix gardeners who received certificates for perfect attendance.

Small Livestock

Due to increased interest in keeping small livestock such as goats, swine and chickens, a full-time assistant livestock specialist was hired to give farmers technical assistance and teach day-to-day management techniques. Workshops and small livestock special interest meetings attracted 287 participants. While goat, sheep and poultry production has increased slightly in the past year, the number of pigs decreased. The pig decline is associated with the high cost of feed, much of which is imported, and the unreliable processing services at the local abattoir. An inventory of all classes of livestock on small farms was begun. In addition, with the assistance of an extension livestock technician, two farms cooperated in major planning changes to utilize minimum space for maximum use. Eventually, these farms will be used as prototypes for other farmers to demonstrate better efficiency on small farms. A 100-acre forage and hay pilot project was initiated jointly with the Department of Agriculture to mitigate the feed shortage problem facing farmers during times of drought. Advice also was given on pasture renovation, health management and improving forage conditions. In St. Thomas a germ plasm nursery was started for forage crops.



Extension director, Darshan Padda visits farm which has installed large grain storage tanks for its chicken industry. Bulk purchases are less expensive but storage has always been a problem in tropical climates.



Dr. Charles Gibson, Extension Veterinarian in charge of Field Services for Michigan State University lectures on dairy reproduction and nutrition problems on St. Croix.



Dr. Samuel Guss, University of Pennsylvania Extension Veterinarian and author of a definitive book on small livestock management, was special guest at a meeting of small livestock farmers where he lectured on new techniques for sheep and goats.

Dairy Extension

In efforts to assist the Virgin Islands Dairy Herd Improvement Association (DHIA), Dairy Extension has



Dairy Extension keeps in close contact with farms like this one at Estate Windsor where cows are being washed prior to milking.

continued to help cooperating dairymen in collecting uniform production and management records to improve management operations. In 1981 and 1982 an average of 517 cows were performance tested monthly and the records were sent to the Raleigh Computer Center for processing and summarization. It was found by dairy extension staff that most cows under local pasture conditions need additional energy and supplemental minerals, especially potassium and phosphorous. Dr. C. Gibson, visiting associate professor of Veterinary Science from Michigan State University spent four weeks on St. Croix to assist dairies with animal health programs, placing particular emphasis on reproduction. Using his recommendations, five St. Croix dairies have increased the percent of cows in milk from sixty to seventy, and reduced calving intervals nearly two months. Dr. Gibson also conducted four workshops on reproduction attended by a total of 70 dairymen and small livestock producers.

Soil Testing

In 1981 preparations were made to establish a soil testing laboratory on St. Thomas. An extension soil specialist was added to the staff and during the year a soil testing program was begun with more than 100 samples sent off island for elemental analysis and fertilizer absorption studies. In 1982 preliminary operations were begun at the soil testing lab using newly installed equipment. More than 9,000 analyses were performed on 754 soil, plant and water samples.

Pesticide Applicators

Training for initial certification and recertification of both private and commercial pesticide applicators continues to be an important educational activity. Over a two year period, 225 applicators were certified in the use of pesticides and the handling of restricted use pesticides. An additional two-day training workshop was held for 43 of the agriculture staff at AES-CES and employees of the V.I. Department of Agriculture. Agricultural training classes for CETA workers assigned to the Dept. of Agriculture were conducted in May and June 1981.



Training and certifying pesticide applicators has been a responsibility of extension working in conjunction with the V.I. Dept. of Conservation since chemicals have assumed such an important role in farming and home gardening. Here training officer demonstrates safety garment to local applicators.

EXTENSION PEST MANAGEMENT - Solving Pest Problems

Island growers are unanimous in agreement that a major problem for successful crop production and raising ornamental plants is the all-pervasive one of pests



Pests and diseases such as ones causing this virus-stunted tomato plant are all-too prevalent in hot climates and represent a real challenge to the extension pest management program.

and their control. Since the island climate with year-round sunny hot weather is ideal for plant pests and diseases, their numbers generally far exceed those in more temperate climates. Among concerns affecting islanders have been mite-induced scarring of coconuts; mango flower and fruit drop due to anthracnose; pinworm on tomatoes, diamondback worm on cabbage, and melonworm on cantaloupe; severe infestation of scale and nematodes causing decline in hibiscus; and a myriad of problems with Cuban tree frogs, termites, bats, birds and rats. Also, public health-related concerns with mosquitoes and sandflies regularly receive attention.

Problem Solving Techniques

The pest management program has addressed many of these problems by using time-proven techniques of direct contact with clients at farms, homes and extension headquarters; or through workshops, field trips, seminars, publications, and classes. A total of 19 workshops attended by approximately 300 participants provided pest and plant disease identification and recommendations. Site visits were made to 397 homes and



It is important to identify each problem as it occurs in fruit trees. In this case, termites have invaded this mango branch.

farms, and 53 demonstrations were conducted on testing methods and products.

A weekly scheduled diagnostic clinic begun in the summer of 1982 now provides walk-in service for residents with ailing plant specimens. Diagnosis and recommendations are offered for a full range of plant disorders as well as public health, arthropod and vertebrate pest problems. A major advance during the year has been in the area of plant disease diagnosis and nematode extraction now available from added staff and collaboration with experiment station scientists.

Another major development in the past year was the launching of a structured field survey and monitoring service for major producers of bananas, plantains, mangoes and tomatoes. This involves regular visits to growers' plots, advisory feedback and integrated control recommendations when needed for insects and other arthropods, diseases, nematodes and bees. Basically, this service is intended to help alleviate the growers'



Similar symptoms require a closer look. Here pest management scientist determines that while the corn leaf appears as if it might be deficient in nutrients, actually the plant has yellow leaf stripe virus which is transmitted by a plant hopper.

uncertainty when faced with pest problems, a major constraint to getting started in local food production.

Pest Control Product Survey

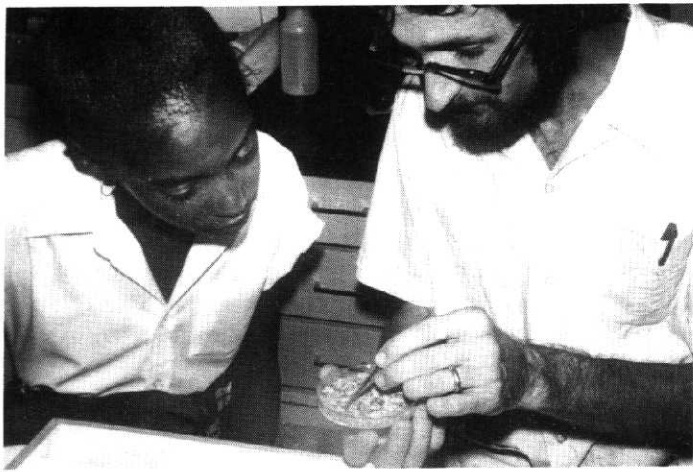
A comprehensive evaluation of the pest control products currently available at 195 retail outlets on St. Thomas, St. Croix, and St. John was completed and annual updates are planned. Information pertaining to major pest problems and suggested key materials to treat them was conveyed to retailers at the time of survey to assist them in appropriate wholesale selection of materials pertinent to the islands' needs.



If uncontrolled, anthracnose fungus can cause up to 50% or more reduction in yield of local mangoes each year in the Virgin Islands, by attacking flowers, young and maturing fruits. Post-harvest loss to anthracnose also can be high.

Targeted Natural Resources Programs

The Virgin Islands extension pest management component has been assuming a broader educational role in terms of natural resources management. The main focus of the natural resources program is to support food self-sufficiency goals in the Virgin Islands because these goals are inseparable from the severe competition for limited natural resources locally. Two programs highlight this new direction, both of them congressionally



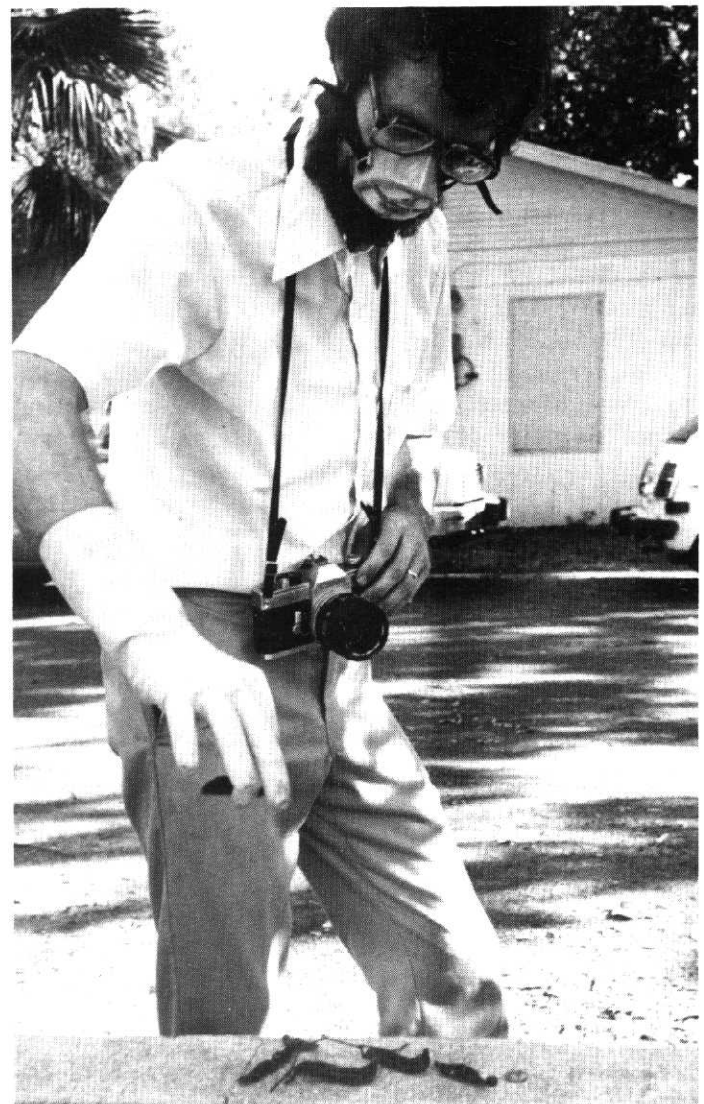
Students from island schools often visit pest management laboratory during class field trips. This young lady is intent on learning about local beetles.



Taking insects to classrooms throughout islands was a combined project of the pest management program working with 4-H. Here extension agent Marti Terry and 4-H aide Leroy James show students a traveling beetle exhibit.

mandated and funded: with the Renewable Resources extension program, concentration is on pasture and rangeland improvement; the Non-Point Source Pollution program assesses the extent and nature of present and perhaps future pollution from agriculture sources. This includes fertilizer, pesticide and sediment run-off into ponds, groundwater, lagoons, bays and other coastal water zones.

A third program also falls within the natural resources category. This is a joint venture between extension pest management and the National Park Service in the Virgin Islands to develop comprehensive baseline information pertaining to natural resources management in the Virgin Islands. Supported by the Natural Park Service in connection with the Man and Biosphere Program of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the extension natural resources component is contributing to the development of a computerized bibliography of all Virgin Islands literature ever published. The program leader serves as associate editor in charge of scientific materials for the bibliography, which is expected to be published in three volumes with over 20,000 citations.



Minute hairs on pods of *Stizolobium pruriens* are so irritating they can cause extreme discomfort if touched. Pest management teams identified this local climbing weed as the cause of death of six thoroughbred horses on St. Croix, who mistakenly ingested the noxious weed which is also called "cow-itc."



Making use of a back pack motorized mist blower can be a real help to farmers, as demonstrated at a field workshop.

Other Useful Services

A close working relationship with USDA's Animal and Plant Health Inspection Service-Plant Protection and Quarantine Office (APHIS-PPQ) resulted in verifying the existence of a potentially serious outbreak of black *Parlatoria* scale insect, a quarantinable pest of citrus. In another case, a more extensive survey was conducted with APHIS-PPQ concerning the potential existence of citrus bacterial canker, one of the most serious citrus diseases known. No infections were found in the territory.

A common weed herbarium collection was begun in 1981 with almost 200 weeds collected and identified thus

far, in collaboration with Dr. F.R. Fosberg of the Smithsonian Institution. Plant identification also played a key role in determining the cause of death of six thoroughbred race horses on St. Croix by poisoning from *Stizolobium pruriens*, known locally as "cow itch", or cowage. In assistance to the Virgin Islands government, a report was prepared regarding the erroneous assumption that there were residual harmful effects from biological warfare trials conducted during World War II on islands off-shore of St. Thomas. This report was widely publicized to allay the fears of local residents that danger from those trials might still persist.

HOME ECONOMICS - Better Living for Our Families



The official dedication and ribbon-cutting of the new, long-awaited home economics laboratory took place in May 1982 with CVI president Arthur A. Richards, home economics program leader Olivia Henry, V.I. Senator John Bell and extension director Darshan S. Padda officiating .

The whirr of sewing machines and soft murmur of voices; the aroma of spicy island cooking; a sense of something going on in a purposeful environment that is creative yet unhurried--this is the atmosphere of the Home Economics Lab which attracts hundreds of par-

ticipants yearly to its many programs. Home economics took on new meaning and added enrichment this past year with the opening of the new St. Croix lab with its modern facilities for cooking (both gas and electric) and 15 new sewing machines for clothing construction classes.

Thousands of Virgin Islands residents were reached by the extension home economics program over the past two years through its many and varied outreach programs conducted in the lab or out in the field on all three islands.

Nutrition and Good Eating

Nutrition programs emphasized cultural food demonstrations including Chinese, Vietnamese and West Indian cooking. The kitchen on St. Thomas was renovated and the home economics staff conducted seven workshops in conjunction with the Family Education Program of the Community Action Agency which were attended by 84 clients interested in nutrition and food selection. Another workshop during National Nutrition Week attracted 20 participants interested in nutrition from a vegetarian point of view. On St. John, three short seminars were conducted in 1982 for a group



The new home ec lab is constantly busy with its 15 sewing machines utilized by different clothing construction and home sewing classes throughout the day.



Personal health is an important aspect of the home economics program. A health educator from V.I. Health Dept. takes a homemaker's blood pressure.

called TOPS (Take Off Pounds Sensibly), with nutritional information provided for the ten dieters enrolled.

Clothing Construction for All Ages

Fifteen classes in basic beginners clothing construction and six for intermediates were held over the past two years. Certificates of achievement were awarded to 83 participants who augmented their wardrobes with stylish and colorful dresses, skirts, blouses and jackets. Twenty-one senior citizens of the STRIVE program were instructed in clothing construction. A fashion show by the creative participants was held, and six received achievement certificates. Twelve aides from the Department of Conservation's recreation program received instruction to improve skills in crafts and clothing construction in order to prepare them to teach other senior citizens groups.



A young teen receives a helping hand from home ec staff member Hope Murphy who instructs her in operation of the sewing machine.

Learning Fun for Teens

Teenagers 13 to 15 years old joined two programs in home economics geared specially for them. The afternoon Teens Program was held each Friday throughout the school year and taught the 66 young people involved the basics of clothing construction, crafts, food prepara-



Macrame making is a popular activity for summer teens.



Summer Teens participant proudly displays her completed basket.

tion, personal development, good grooming and consumerism. The Summer Teens program continued to grow in popularity, with 70 applicants for the 30 spaces filled in 1981 and a total of 55 (32 on St. Croix, 15 on St. Thomas and 8 on St. John) enrolled in 1982. Featuring an emphasis on personal development, Summer Teens met for six weeks during the summer, with interesting



Basketry is a traditional craft in the Virgin Islands which is rapidly becoming obsolete. Teenagers in the home economics summer programs are taught how to weave simple styles in the hopes of keeping the art alive.

programs scheduled throughout each weekday. Participants learned basketry, macrame, clothing construction, good grooming and poise, decoration, nutrition and meal preparation.

Helping Those Who Need It

Major highlights in working with community groups included participation in the International Year of the Disabled and assisting hard-of-hearing students at Central High School. In an effort to brighten the hearts of the elderly, games and activities were provided for shut-ins and handicapped elders at the Herbert Grigg Home for the Aged. In Frederiksted home economics staff members and the New Horizon Club planted a beautiful mango tree in the Whim Gardens yard. To help the deaf students, money was raised by homemakers club members as a donation to defray the cost of athletic equipment badly needed by the students. Homemakers clubs also contributed to a national fund raising program conducted by the National Extension Homemakers Council which was donated to the Save the Children and Nutrition Fund.

Because the cost of energy is so high in the territory,



Cake decorating is always popular with the teen groups at home economics sessions.



Practice makes perfect is an apt slogan for these girls who display their first efforts at cake decorating.

extension home economics conducted an energy saving seminar to assist residents to learn about special techniques to cut energy costs and new ideas in solar and wind energy for homes. Representatives from the Virgin



Another ribbon cutting -- this time at Paradise Mill project Community Club room. Housing Commissioner Juan Centeno wields the scissors at entrance to the tastefully decorated room created with assistance from the home economics program.

Islands Energy Office and several local energy firms served as guest speakers.

Paradise Mills Homemakers

Working closely with the Commissioner of Housing, a new program was launched to assist homemakers at Paradise Mill. Staff, personnel and homemakers at the project received training in the principles of good house-keeping and home management as well as learning

about container and small plot gardens with the assistance of the extension agriculture program. The first phase of the home beautification program at the housing project was completed in July 1982, when the new community club room was officially opened, home gardens and decorations were proudly displayed, and the many residents shared in a communal celebration. Twenty-one homemakers participated, with 12 receiving special commendation certificates.

4-H YOUTH - Advancing to New Horizons

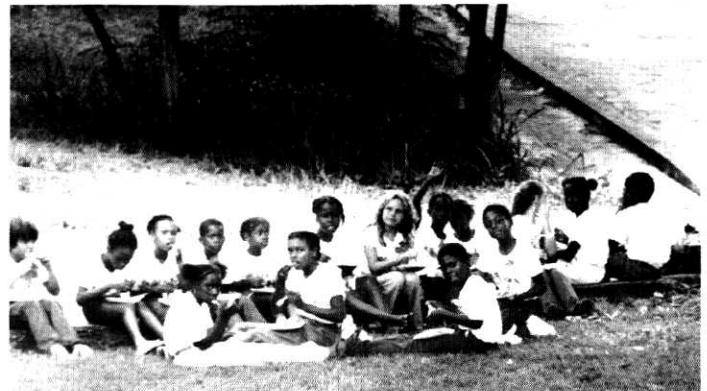
The years 1981 and 1982 were exciting ones for extension 4-H Youth Development as the staff and programs took on added dimensions and new directions which established a good base for dynamic expansion and effective youth development in the future throughout the territory. Grants were received to accomplish many of the 4-H goals towards awareness of cultural identity as youth with a proud heritage not only as U.S. citizens but as Virgin Islanders and members of the entire Caribbean community. Career awareness training for young 4-H'ers, building special programs with other youth agencies, and skills training for 4-H members, volunteer leaders and staff--all served to reinforce and strengthen the role of 4-H as an esteemed youth agency in the community.

Summer Camp Serves Island Youth

The 1981 4-H Summer Camp program was greatly expanded, with 575 youth and 60 counselors involved in 1981 as compared to 300 youth and 44 counselors in 1980. With camp sites on all three islands, the year's program signaled the initial start for the new ADVANCE concept, which stressed traditional skill advancement as well as cultural exploration and leadership development. As part of the 4-H "five year plan," the concept was instituted in all 4-H programs throughout the following year, with information about its pro-

gress published in the quarterly 4-H newsletter.

In 1982 the six-week summer camp involved 547 campers and 56 counselors. Programs stressed during both seasons included safety, home economics, arts and crafts, agriculture, environmental study, recreational activities, and field trips to historic sites, industrial complexes and the seashore. Innovations were found in values clarification sessions, learning cultural dances, mobile TV workshops with a local media group, and Miss Summer 4-H Queen contest. The traditional Field and Awards Day ended both camp sessions, with campers pitting their skills against each other in athletic events, dances, singing and craft displays.



A lunchtime break is enjoyed by St. Thomas 4-H summer campers.



An innovation at 4-H Summer Camp in 1981 was the TV workshop for older campers conducted in cooperation with a local media group, Caribbean Center for Understanding.



Keeping his eye on the ball is this 4-H camper during a sports and recreation period.



Crafts of all kinds, such as mat weaving, appeal to young 4-H'ers like John at 4-H summer camp.



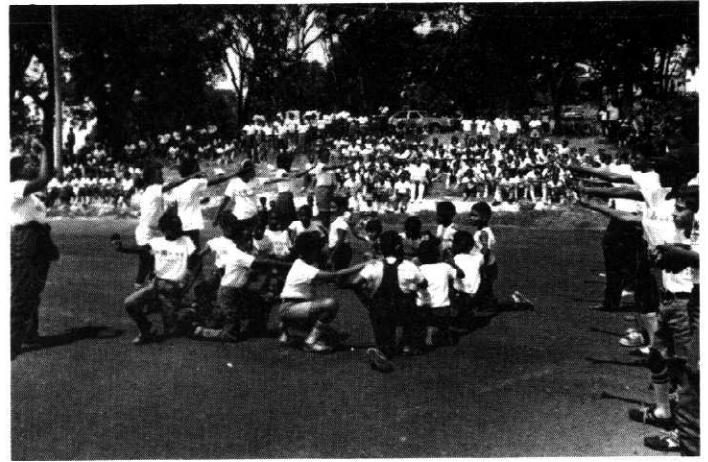
It's fun to take home an achievement certificate when camp is over after a busy 6 weeks of activities on St. Thomas.

Grants for Cultural Exploration

Two major efforts which achieved considerable success were the Island Identity grant of \$2500 from the Endowment for the Humanities and the V.I. Caribbean Youth Conference, sponsored in part by the college,



Waving flags from the 10 Caribbean islands they represented, 48 delegates to the Caribbean Youth Conference held in March 1981, got together to celebrate after three days of intensive workshops.



Henderson 4-H camp presents a colorful drill for campers from other sites during final field day.

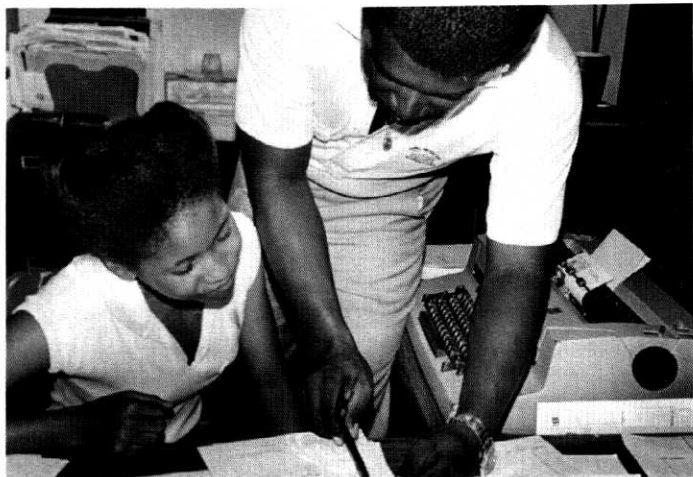
which was held during March 1981 Inauguration Week for Dr. Arthur A. Richards, the new college president. The grant enabled the 4-H program to bring citizens together with diverse backgrounds and interests in a series of six seminars on both St. Croix and St. Thomas. These seminars lead to an evaluation and recommendations for 4-H program direction over the ensuing five years. Data was also collected at individual interviews and from trips to St. Kitts, Tortola, Barbados, and the Dominican Republic (Ibero-American Rural Youth Conference.) Continued emphasis on inter-Caribbean exchange took place in 1982 with visits between St. Croix and Nevis. Two 4-H members and an adult leader from each island visited their counterparts in March. Trips were awarded to 4-H'ers who had shown leadership abilities.

The V.I. Caribbean Youth Conference was sponsored by the extension service to explore issues of Caribbean identity and to develop pertinent youth programs. Working cooperatively with the St. Croix Young Peoples Union in establishing goals, the conference welcomed 48 delegates from 10 islands, including the three U.S. Virgin Islands. The enthusiastic, highly articulate young people met in workshops and general meetings



Emphasis was placed on inter-Caribbean Exchange, with 4-H'ers from St. Croix and Nevis visiting each other's islands.

over a three-day period at their Girl Scout Camp site headquarters. A report was published and sent to all state 4-H programs and to English-speaking Caribbean countries.



On-the-job apprenticeship for 20 4-H'ers found them learning a variety of new skills, such as Rhonda Dore's experience in checking reservations at Hotel-on-the-Cay.

Other Grants Broaden 4-H Outreach

A \$2500 grant provided by the Private Industry Council lead to four successful Career Weekends held at the Howard Wall Boy Scout Camp over a four month period for 45 teenagers. Youth prepared their own meals and attended work sessions conducted by island leaders and professionals. Career training was also encouraged during the summer of 1982 for 20 young people who apprenticed on-the-job at a wide variety of business firms, hotels, airlines and the National Guard.

A grant of \$450 was received from the St. Thomas Garden Club to encourage gardening by youth with special awards bestowed at the St. Thomas Agricultural Fair in May 1982 to all successful young gardeners who exhibited their achievements. A "Citizenship in Action" grant of \$500 was received from Reader's Digest Foundation for a project initiated by the Frangipani



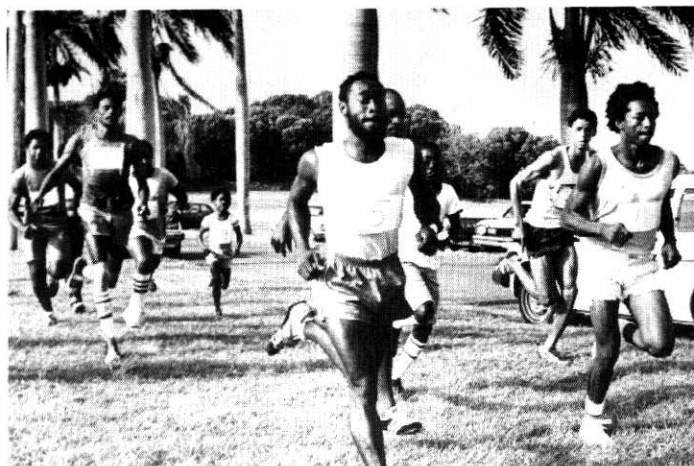
The Frangipani 4-H Club received a grant from Reader's Digest Foundation which assisted them in building a handsome new entrance-way to their sector in Mon Bijou.

4-H Club to construct an entry wall with landscaping at their Mon Bijou homesite on St. Croix.

Working With Other Youth Groups

Joint efforts with four other youth agencies expanded the resources provided by 4-H to include young people involved in many interests. A major joint funding project with the Arawak Program begun during the summer of 1980 provided Arawak with increased personnel and materials. Utilizing 4-H practical skills programs, 70 young people with problems were served initially. This Arawak/4-H practical skills sequence was continued through March 1981, providing for an increase of six staff members and new materials for 40 other youngsters undergoing difficulty in school. The skills emphasized were agriculture, animal husbandry, ceramics, marine biology, sewing, food preparation, career awareness and public relations.

In cooperation with St. Croix Boys Clubs, 4-H assisted in augmenting a Boys Club/4-H Carpentry Lab in Frederiksted. Through joint funding carpentry equipment was purchased for use by 4-H groups beginning September 1981, while during the summer months through 4-H efforts the lab was funded for a CETA training project to make and sell wood outdoor "Adirondac" chairs, which proved to be a profitable venture all around. Skills training lead to productivity which was rewarded through the self-esteem derived from sale of the items.



Joining up with V.I. PACE, 4-H physical fitness runs were held Saturdays on the St. Croix campus for participants ranging in age from 3 to 60 plus.

Another joint agency activity was the 4-H/V.I. Pace Physical Fitness running program held on Saturday mornings for 20 participants from three years of age to sixty-plus at each running session. Also an Animal Husbandry special interest 4-H club involving 4-H'ers and members of Future Farmers of America (FFA) included 16 young people who received calves donated by local livestock owners. Monthly workshops were held in calf care, feeding and recordkeeping. A stipulation of the 4-H/FFA calf program is that the calf must be shown at the agricultural fair for the ensuing two years and then may be sold.



Extension's 4-H dairy calf program worked cooperatively with other youth programs such as Future Farmers of America in assisting young people learn about the care of livestock.

Program Development and Youth Leadership

Attendance at two important meetings held off-island annually does much to reinforce program direction, updating of techniques and stimulating leadership responsibility, and development of volunteers. Six volunteer leaders in 1981 and four in 1982 attended the October Rock Eagle (Georgia) Conference where they received new inspiration and skills in order to institute monthly leader's training on St. Croix and St. Thomas. There are currently 41 volunteer leaders on all three islands.

With continual emphasis on the need for youth leadership as part of the overall 4-H plan, delegations of local 4-H youth leaders (five in 1981 and six in 1982) attended the annual 4-H Youth Conference held in Washington, D.C. each spring. There they participated in efforts to design 4-H programs reflecting present and future needs and also learned new leadership skills for their own participation in local 4-H. In addition, an adult program advisory committee composed of eight community leaders, met monthly to assist in implemen-



4-H Program leader Alan Oliver gives a certificate of achievement to Terrance James of Mutual Homes Superstars 4-H Club during Awards Night ceremonies in 1981.

tation of the 4-H plan-of-work and help design future programs.

Staff visits to National 4-H Center in Maryland, Michigan State University Exploration Days and First Anniversary Celebration of 4-H on the island of Nevis all provided added impetus to the 4-H program. To upgrade management skills two consultants visited 4-H in the Virgin Islands: a representative from the Minnesota 4-H Foundation presented a workshop series on successful fundraising which was attended by many community youth organization representatives in addition to 4-H, and a Michigan extension agent spent one month in training 4-H personnel and overseeing plans for increasing office and staff efficiency.



Strawberry 4-H "Pom-Pom Girls" performed at 1982 Awards ceremonies.

National 4-H Week

The 27 4-H clubs on all three islands comprising 1229 members celebrated National 4-H Week in the Virgin Islands with imaginative programs and colorful awards ceremonies. Since Arbor Day in the islands coincides with 4-H Week, tree plantings took place on the St. Croix campus, in Frenchtown on St. Thomas and in Coral Bay on St. John. To stress the importance of cultural heritage, former teachers, renowned as old-



At the end of a busy day collecting insects in the field, these "Stingers" pause for a moment with their leader, extension agent Marti Terry.

time storytellers, regaled 4-H'ers with tales of jumbies and anansi, the spider.

Youth Become "Stingers"

The pest management staff organized a special interest 4-H club called "The Stingers" for 25 youth which met for classes weekly in 1981, with collecting and identification field trips held on weekends. In 1982, 215

young people participated in insect natural history projects conducted in cooperation with the St. Croix school system. Youth projects featured collecting trips, student-constructed science exhibits, guest speakers from the pest management and pest control field, films on insects and field day events. Almost 1000 people viewed the various exhibits prepared in connection with "The Stingers" special interest program.

COMMUNITY AND RURAL DEVELOPMENT - Helping People Work Together

Encouraging the development of small business, better farm management practices, understanding of agricultural economics, and helping people realize their potential in a growing community--all of these are challenging aspects of the extension community and rural development (CRD) program. Techniques to help strengthen the community's ability to define and solve problems include seminars, working cooperatively with other governmental agencies and community groups, conducting surveys and assisting with the formation of special interest groups such as an association for farmers. Perhaps the most important challenge for CRD is to help develop an awareness of the possibility and ways for achieving success within the framework of contemporary island society.

Helping the Small Business Person

During the past two years, two highly successful two-day business seminars were conducted by CRD for a total of 375 individuals who were interested in going into business for themselves or who wished to expand small businesses. Geared initially for residents of the

west end town of Frederiksted which is attempting to upgrade its economic base, the seminar series attracted people from all over St. Croix. Co-sponsoring the seminars was the West End Development Coalition in conjunction with the V.I. Department of Commerce.

Resource persons representing a wide spectrum of governmental agencies and the private sector addressed participants on their areas of expertise. These included representatives from the Small Business Administration, the Small Business Development Agency, Consumers Service Administration, Internal Revenue Bureau, and FmHA. Bankers and private firms in fields such as insurance, accounting, public relations, advertising and marketing, offered helpful information about loan procurement, bookkeeping, payrolls, tax forms, insurance protection, and projecting a positive image. Successful local merchants explained the need for good consumer relations, attractive store displays, and updated methods for purchasing, pricing and inventory. The topics sparked much questioning and discussion, demonstrating the wide interest which the Frederiksted business community in particular feels regarding revi-



Reaching the needs of the business community was achieved through 2-day seminars held in Frederiksted such as this one at St. Gerard's Hall.



Successful local merchants and those in such fields as advertising and store display served as resource specialists at seminars.

tialization of its town.

CRD worked with the Department of Commerce also in its economic adjustment strategy plans for western St. Croix. This bootstrap type operation is geared towards marshalling the necessary funds and technical assistance to provide an orderly development and improvement plan in the Frederiksted area.

Students Learn While Working

In 1981, CRD embarked on an experimental work program which introduced high school students to various employment opportunities in agriculture. Seven high school students were employed as apprentices in the agronomy, fruit and vegetable programs. In the summer of 1982, students conducted agricultural marketing surveys. Production information was collected from most of the farmers on St. Croix to determine the island's current production level. The survey also included data taken from marketing outlets such as supermarkets, grocery stores and farmer's markets. Island hotels were surveyed to determine the amount of agricultural products consumed by off-island guests. A presentation of the ongoing development of the marketing study was made to the Senate Committee on Agriculture in July 1982.

Farm Management

Seven enterprise budgets on crops and livestock were prepared to assist farmers in making estimates on costs of production. Budgets include such crops as bell pepper, cassava, pineapple, mango, avocado, lime and goat production. Pro-forma income statements, balance sheets, and cash flow statements for various crops as well as production record forms were also prepared for future dissemination.

Assistance and guidance in the formal organization of the St. Croix Farmers Cooperative Association to conform with V.I. laws was provided by CRD specialists. By-laws, articles of incorporation and a constitution were developed over a four-month period. Among the chief aims of the new association are to further agricultural development in the islands and to assist local farmers in obtaining both private and governmental

assistance. The association is also seeking to develop cooperatives for bringing agriculture production resources to the islands and to form a marketing cooperative for sales of produce.

Links to the Community

CRD on St. Thomas continued to strengthen links to community groups and governmental agencies. Each summer since 1979, CRD has joined with the Department of Conservation and Cultural Affairs and 200 Youth Conservation Corps students in the Megans Bay Arboretum restoration project and Agricultural Awareness Program. An environmental study is presently being prepared for the Megans Bay area. Extension was also represented on the advisory boards of the Department of Education's Environmental Studies Program (ESP) and the Instructional Curriculum for Environment Project (ICE). Workshops for the V.I. Teachers Corps project were also conducted by the CRD program.



CRD program leader Kwame Garcia met frequently with Dept. of Commerce economist to discuss needs of business community.

Technical advice involving the development of agriculture and crafts programs for The Project St. John was furnished and staff members gave agriculture seminars and served in an advisory capacity to the St. Thomas/St. John Farmers Association. Assistance was also provided to the V.I. Planning Office in procuring a Community Block Development Grant pertaining to the Ujamaa Organic Gardening Project on St. Thomas and one for the Carolina Bay Rum restoration/community center project on St. John.

Working closely with the National Park Service, an herbarium for the territory was augmented with specimens from both St. Thomas and St. John. Demonstration plots were established to provide energy information on the use of legumes to reduce nitrogen fertilizer dependence, utilizing both indigenous and imported legumes. As a follow-up, a community seminar was held on the use of organic fertilizers.

Interagency Meetings

CRD personnel attended seminars on "Leadership

Development in Rural America” and “Recent Developments in U.S. Offshore Areas.” The first was geared towards understanding some of the problems facing small farmers and the second in understanding the relationship between the territorial and federal governments. As a member of the Puerto Rico/Virgin Islands

Emergency Preparedness Board, a staff member participated in meetings so as to be informed and available in the event of a natural disaster in the Virgin Islands and to be prepared to interpret natural disaster assistance obtainable from the U.S. Department of Agriculture.

AGRICULTURE AND FOOD FAIR - Showcase for Extension



Dr. Arthur Richards and Dr. Darshan Padda pause for a moment with some of the Land-Grant team during the 1981 Food Fair on St. Croix. Behind them is large area where CVI exhibits by extension and experiment station are displayed.

Each year the annual Agriculture and Food Fair on St. Croix, sponsored jointly by the Cooperative Extension Service and the Virgin Islands Department of Agriculture, surpasses former years in size and attendance. Almost 21,000 persons attended the fair in 1981 and in 1982 there more than 23,000 fairgoers. It is this yearly event which serves as a showcase for extension service activities and the range of agricultural research. Colorful exhibits which covered one-third of the exhibit building floor space explained the far-reaching scope of extension from youth and community activities to agricultural assistance and family enrichment.

Fruit, vegetable, agronomy and irrigation specialists displayed practical techniques and methods for growing and irrigating the best island varieties of crops such as legumes, papaya, banana, cassava and tomatoes in addition to some relatively unknown tropical vegetables like luffa, pakchoy and bodie beans in small garden

plots and containers. The aquaculture program featured a small recycling system involving both fresh-water fish rearing (tilapia) and hydroponic gardening (tomatoes, lettuce, pakchoy and eggplant) utilizing 55 gallon oil drums. This prototype for larger more sophisticated systems now under construction, created many interested inquiries since it is relatively simple and inexpensive to build in the backyard. The animal science program exhibit demonstrated the effect of different types of feed on the quality of meat and showed a miniature dairy farm lay-out. As in past years, animal science staff presided over the judging of many large and small livestock which were entered for coveted ribbons and prizes.

Demonstrations of alternative means of pest control in home and garden along with biological control methods and pesticide application techniques were a feature of the pest management exhibit. The micro-



St. Thomas/St. John Agriculture Fair began with opening ceremonies presided over by Extension Coordinator John Matuszak.

scopes were a popular attraction, with various insects displayed for young and old viewers. The agriculture program featured many local fruit trees for the residential yard and three breeds of dairy goats were shown by the livestock component. Among the new popular exhibits was an energy demonstration of an alcohol distillation unit and solar roaster and a special "mini-theatre" which showed films on energy, insects and plant quarantine.

With the theme in 1982 of "Grow More Food in '82; Eat Well and Preserve Some Too," the emphasis was placed on preservation through processing food grown in the Virgin Islands. Highlighting this were demonstrations of canning by a representative of Kerr Glass Canning Company whose visit from Oklahoma was arranged by the extension service. In regularly scheduled sessions throughout the three-day fair, viewers learned the process of canning beans, tomatoes and pineapples by cold pack, water bath and in preserves. While many of these processes are commonly used in most stateside farm households, in the islands canning is



Aquaculture scientist Dr. James Rakocy explains the backyard model of a small tilapia fish rearing system to Gov. Juan Luis and Senator William Harvey while extension director Darshan Padda looks on.



A prize wins a prize! St. Thomas farmer Altigracia Wenner prepares to take home a new ram goat prize, won because her own goat took first place at the St. Thomas Agriculture and Food Fair.



St. Thomas fair visitors stop at extension agriculture booth manned by horticulturist Clinton George and extension agent Carlos Robles.



Latest techniques in canning foods were demonstrated by a representative of the Kerr Canning Company from Oklahoma who is shown next to Home Economics program leader Olivia Henry (with mike) during an interlude at the fair. With them are Extension aides Maria Flores, Hope Murphy, Agatha Ross and Esther Mischer.



Awards for young 4-H gardeners on St. Thomas were made possible by donation from St. Thomas Garden Club. Prize winners pose at annual Agriculture Fair at CVI in May.

a relatively new method for preservation of food.

Local cooks who are known for their culinary prowess shared their knowledge with fair visitors by demonstrating tasty drinks and dishes. They also explained preservation of food by drying and salting. The ever-popular "bush tea" exhibit, with its many jars of dried leaves attractively arranged on a large wall shelf unit, attracted many old-timers who were familiar with the efficacy of Belly-Ache bush, Black Wattle, Jumbie Pepper bush and Spanish needle.

Demonstrations were conducted on plant propagation methods, legume inoculation, soil testing and care and grooming of goats. A special feature was the karate exhibit by a 4-H program assistant. The 4-H exhibit area in 1981 and 1982 was doubled in size from previous years, with 4-H'ers representing all three islands on hand to show their crafts and again take top ribbons in the youth category. New in 1982 was a solar energy exhibit, many breeds of rabbits for home use, and masks and lanterns created for Christmas festival parades.

Beginning in May 1981 and again in 1982, extension and the St. Thomas/St. John Farmers Association in cooperation with the Department of Agriculture presented a smaller version of the St. Croix fair at the gymnasium on the St. Thomas campus. This one-day event grew in size from its modest beginnings, and some 5000 people attended in 1982. Small livestock were judged, propagation workshops attracted attentive audiences who learned how to graft mangoes and avocados, and extension mounted attractive exhibits on pest management, 4-H youth achievements and home economics displays of food and hand-sewn clothing. Other cooperating community groups were the Hibiscus Society which presented a lavish display of local hibiscus and the St. Thomas Garden Club which also gave prize awards to winning 4-H gardening displays.

ASSOCIATE DEGREE IN AGRICULTURE

The Associate of Arts degree in Agriculture has been offered at the college since 1979 as part of its land-grant program because of renewed interest in agriculture both as a source of food and as a career. The AA in Agriculture provides information on a credit basis through both formal classroom instruction and informal laboratory experience in the field in such technical areas as crop production, animal husbandry, agri-business and the development and use of increasingly sophisticated

equipment.

In the 1980-1981 academic year courses in Introduction to Agriculture, Agronomy and Agricultural Economics were offered on both the St. Croix and St. Thomas campuses with a total of 48 students in attendance, 24 on each campus. In the 1981-1982 academic year a total of 38 students, 22 on St. Croix and 16 on St. Thomas, were enrolled in either Introduction to Agriculture, Tropical Horticulture or Animal Science.

VISITORS.....AND OTHER ACTIVITIES



Caribbean American Linkage Conference funded by Phelps Stokes to provide educational interchange for minority institutions concluded Caribbean tour with a visit to St. Croix in April 1981. Director Marie Gadsen is shown (center) with CVI President Arthur Richards and extension director Darshan Padda.



The annual meeting of the Southern Regional Beef Breeding Technical Committee (S-10) was hosted by the Agricultural Experiment Station on St. Croix in June 1981. The regional group comprises 13 southern states and is concerned with breed evaluation and improvement.



Extension directors and their spouses from 11 Southern states held their annual meeting on St. Croix in May 1982 when they evaluated the V.I. extension outreach program. Joining them in a visit to the Gaspari farm was USDA extension administrator Mary Nell Greenwood (standing center with shoulder bag).



Experiment station directors from across the nation converged on St. Croix for the 1982 spring meeting of the Experiment Station Committee on Organization and Policy (ESCOMP). Included in their itinerary were visits to cooperating farms such as that of Oliver Skov in Mon Bijou.



Dr. Harold Hupp (left), assistant director of CVI's Agricultural Experiment Station, shares a moment with ESCOMP's chairman, Dr. Kenneth Wing, director of Maine's experiment station.



Staff management workshop held on main CVI campus was attended by many from the land-grant programs and their counterparts in the academic program.



Preparation for extension's first World Food Day event included tiny tomato seedlings planted in paper cups which are examined by Home Ec's Olivia Henry, ANR's Dave Farrar, Marti Terry from pest management and 4-H youth specialist Zoraida Jacobs.



Dr. Bob Brander, Chief Naturalist of the St. John National Park Service, and Prof. Ray Woodbury, renowned tropical botanist, collect plant specimens as part of a survey of the flora of St. John, for the extension diagnostic herbarium on St. Thomas.

STAFF 1981 and 1982

Administration

Darshan S. Padda Director, AES-CES
Harold Hupp Assistant Director (AES)

Kwame Garcia Assistant Director (CES)
Bonnie Andrews Administrative Assistant

AGRICULTURAL EXPERIMENT STATION

Animal Science

Harold Hupp Animal Specialist
Douglas Wright * Research Assistant II
Sarah Dahl Research Assistant I
Audrey Valmont Research Technician I
William Janes * Research Technician I
Yvonne Horton Secretary

Eric Dillingham Research Technician I
Station Superintendent

Francisco Medina Research Assistant II
Victor Vasquez Research Assistant I
Lisa Yntema Research Technician I
Coreen Hughes Secretary I

Aquaculture

James Rakocy Research Aquaculturist
Ayyappan Nair Assistant Aquaculturist
Mark Pacifico * Research Technician I
James Clark * Research Aide I

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