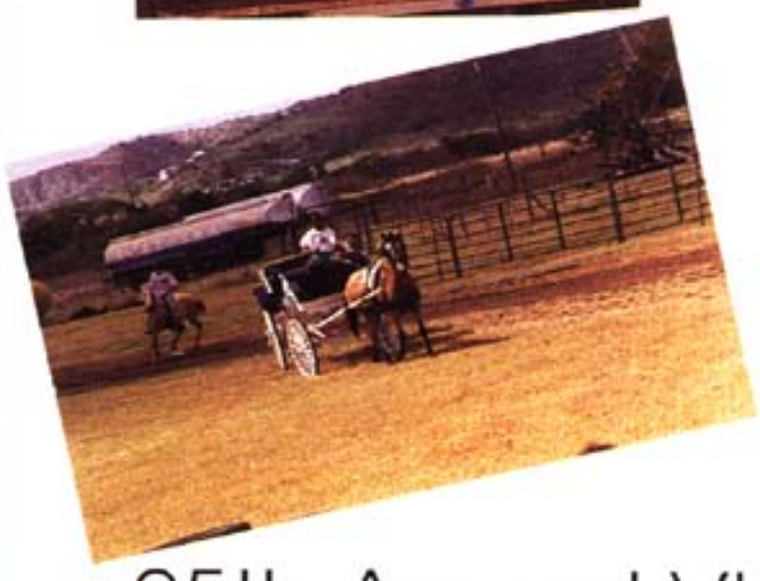
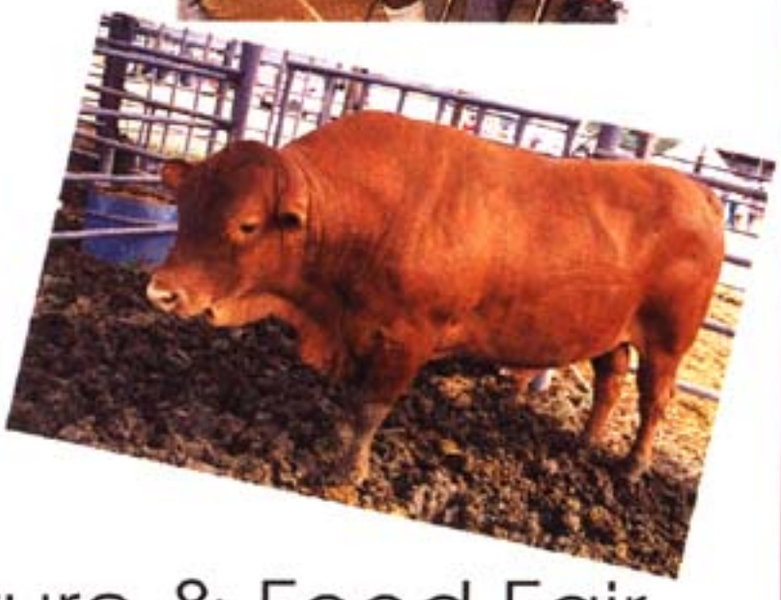
Twenty-Five Years Of Challenges Changes & Opportunities





25th Annual Virgin Islands Agriculture & Food Fair

February 17th, 18th & 19th, 1996

Jointly Sponsored By The V.I. Department of Agriculture and The University of the Virgin Islands Cooperative Extension Service • Agricultural Experiment Station

"Twenty-five Years of Challenges, Changes and Opportunities"

Editor
Clarice C. Clarke

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and
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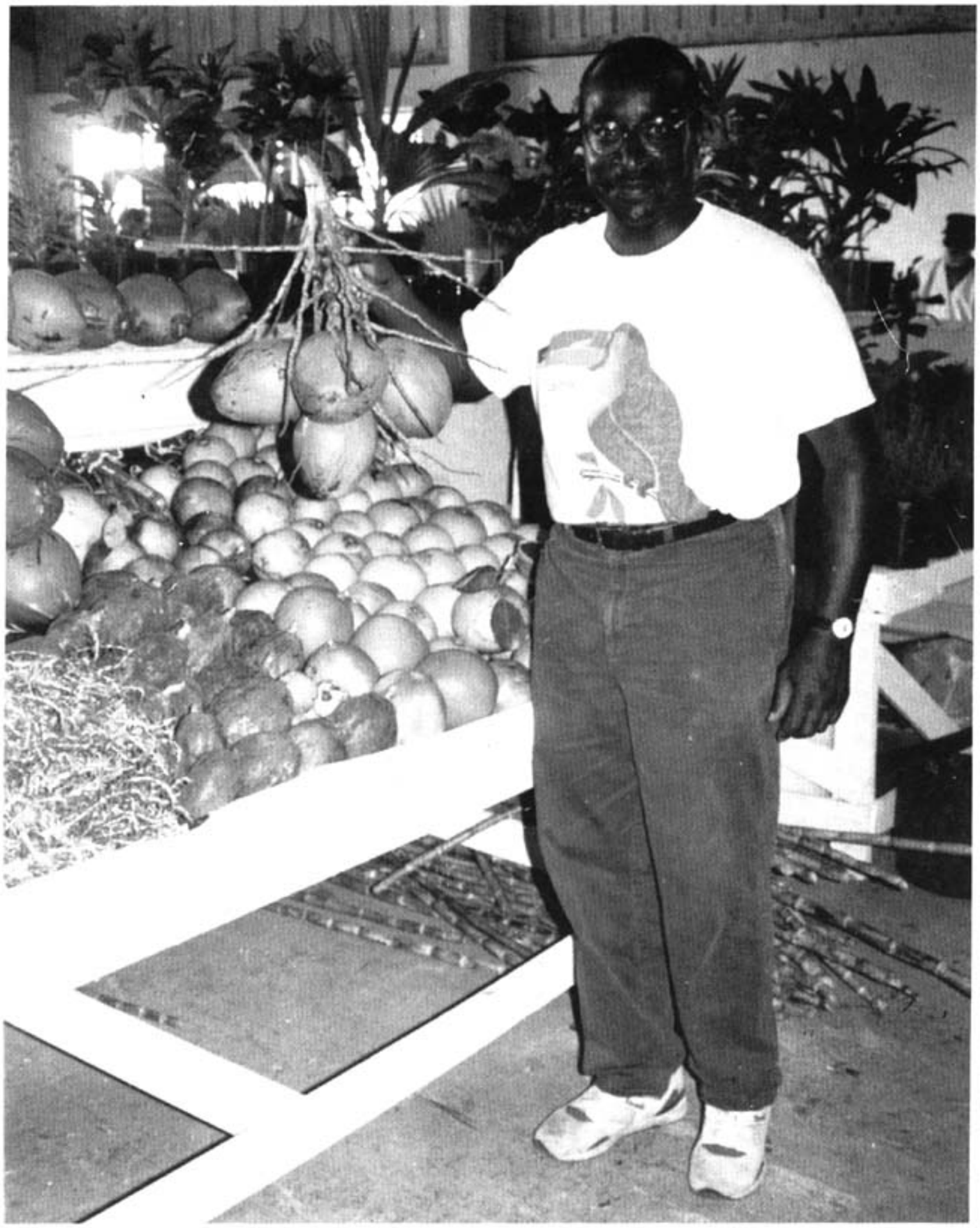

A Publication of the 25th Annual Virgin Islands Agriculture and Food Fair

1996

Bulletin Number 10

Table of Contents

1996 Agriculture and Food Fair
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Message from Honorable Dr. Roy L. Schneider
Governor of the Virgin Islands

MESSAGE FROM THE GOVERNOR

Greetings and congratulations are offered to the participants and friends of the 1996 Agriculture and Food Fair in celebration of twenty-five years of "Challenges, Changes and Opportunities."

This year's celebration is particularly significant due to the many important changes that have been made with regard to the improvement and implementation of additional services provided to the Territory's farmers. The establishment of the new Department of Agriculture now allows for the individual focus and recognition for its contribution to the economic prosperity of these Virgin Islands.

In our efforts to improve the plight of our farmers who have dealt with drought and more recently, the ravages of Hurricanes Luis and Marilyn, we must include in the curriculum of our educational system, the advantages of agriculture and its importance to our advancement. We must encourage the participation of our young people in the agricultural process, thus increasing job opportunities and growth in production.

On behalf of the people of the Virgin Islands, Mrs. Schneider joins me in offering our congratulations to the Department of Agriculture and other organizers for their efforts to promote agriculture as an important and viable source of income for the Territory. Best wishes for an enjoyable day.

Message from Dr. Orville Kean
President, University of the Virgin Islands

It is my pleasure to extend congratulations to everyone involved in the celebration of the 25th anniversary of the Agriculture and Food Fair of the Virgin Islands. I am extremely proud that the University of the Virgin Islands is a co-sponsor of this community event. I am also pleased that the theme, "Twenty-five Years of Challenges, Changes and Opportunities," accurately expresses my vision of UVI's position in the community.

During the twenty-five years, the Research and Land-Grant component, working in partnership with the Virgin Islands Department of Agriculture, has played a major role in the development and success of the Fair. It is my pledge that the university will continue to play an integral role in the continued success of the Fair.

The Agriculture and Food Fair is an excellent vehicle that aids the university to bring to the community the latest research in the field of food and natural resources. Currently, at the UVI Research and Extension Center, scientists are developing and using genetic engineering to improve tropical plant production in the Virgin Islands and the Caribbean. Research also involves inserting a dwarfing gene into hibiscus and bougainvillea to control plant size and improve water use efficiency and drought tolerance. These research projects emphasize my goal of making the university a center for technology transfer and utilization.

I wish to commend the UVI Land-Grant staff and the Agriculture and Food Fair Board who contributed so much time and effort toward making the Fair a tremendous success and for their dedication and commitment in organizing this community event for all Virgin Islands residents. The Fair has become an important tradition in our community and I urge Virgin Islanders to visit all of the exhibits, but, in particular, our UVI Land-Grant booths which demonstrate our goals and efforts.

Enjoy the Fair!!!

Orville Kean, Ph.D.
President

Message from Dr. Arthur C. Petersen, Jr.
Commissioner, Department of Agriculture

Welcome to the 25th Anniversary celebration of the Agriculture and Food Fair of the U.S. Virgin Islands jointly sponsored by the newly created Department of Agriculture and the University of the Virgin Islands. We are proud to continue to take part in this time-proven tradition.

Indeed, the Annual Agriculture and Food Fair of the Virgin Islands does represent twenty-five years of challenges and opportunities and so have fairs since they first began. Fairs have their beginnings in ancient Egypt and Mesopotamia and are noted among some earliest civilizations. Fairs offered amusement and contact with neighbors at a time when entertainment and opportunities for interaction were limited. Today, fairs give people the opportunity to review the products and accomplishments of the people, including the talents and abilities of creative young people. Our annual fair is about our people coming together with a sense of pride, and in recognition of the accomplishments of our agricultural and food producers. The annual agriculture and Food Fair highlights our vital agricultural industry. It brings together people who play an integral role producing our food, those who cook it, and those who consume it. It is also an educational event and, equally important, it is fun.

As president of the 1995 Annual Agriculture and Food Fair of the U.S. Virgin Islands, I am also very proud of the opportunities the fair provides for our youth. Visits to the schools' exhibits clearly show that they participate and compete. Their exhibits highlight a variety of agricultural production and processing opportunities. It shows that the youth can help communities bridge the gap of understanding among all aspects of our society.

The Agriculture and Food Fair of the U.S. Virgin Islands is also a showcase of the many qualities that make the U.S. Virgin Islands an ideal location for families. The annual fair is a place where families come to enjoy themselves in the atmosphere of an event that has now become a part of our rich cultural heritage.

I would like to congratulate all the members of the Board of Directors for their continued dedication and commitment to the planning and organizing of another successful fair and for the special celebration activities marking the 25th anniversary.On behalf of our illustrious Governor Roy L. Schneider and Lieutenant Governor Kenneth E. Mapp, and the Board of Directors of the Agriculture and Food Fair of the U.S. Virgin Islands, again, welcome everyone to the 25th Annual Agriculture and Food Fair. Let the challenges and opportunities continue!

Arthur C. Petersen, Jr., Ph.D.
Commissioner

Agriculture And Food Fair--A Success Story In Partnership

by
Dr. Darshan S. Padda
Vice President
University of the Virgin Islands

I am inspired by the importance of changes that the University of the Virgin Islands (UVI) outreach programs have made in the lives of people across the territory and the wider Caribbean, and I am challenged by the possibilities for the future.

With the Land-Grant status granted in 1972, the Virgin Islands' only institution of higher education embraced the idea that the knowledge within the institution should be made available to those not attending the institution and should continue to be available throughout one's life. Thus, one of the most successful vehicles for taking the University to the people has been the Virgin Islands Agriculture and Food Fair.

Personally, the annual Agriculture and Food Fairs have served as a milestone in my journey as a Virgin Islands resident. Having arrived on St. Croix on January 14, 1972, I immediately got involved in the activities of the Virgin Islands Department of Agriculture (VIDA) which was then the sole sponsor of the Agriculture and Food Fair. As an employee of VIDA, I was asked to participate in the department's fruit and vegetable exhibit and, thus, had the opportunity to explain to the then Governor Melvin Evans, the various food production and marketing programs that VIDA and the U.S. Department of Agriculture(USDA) were jointly conducting.

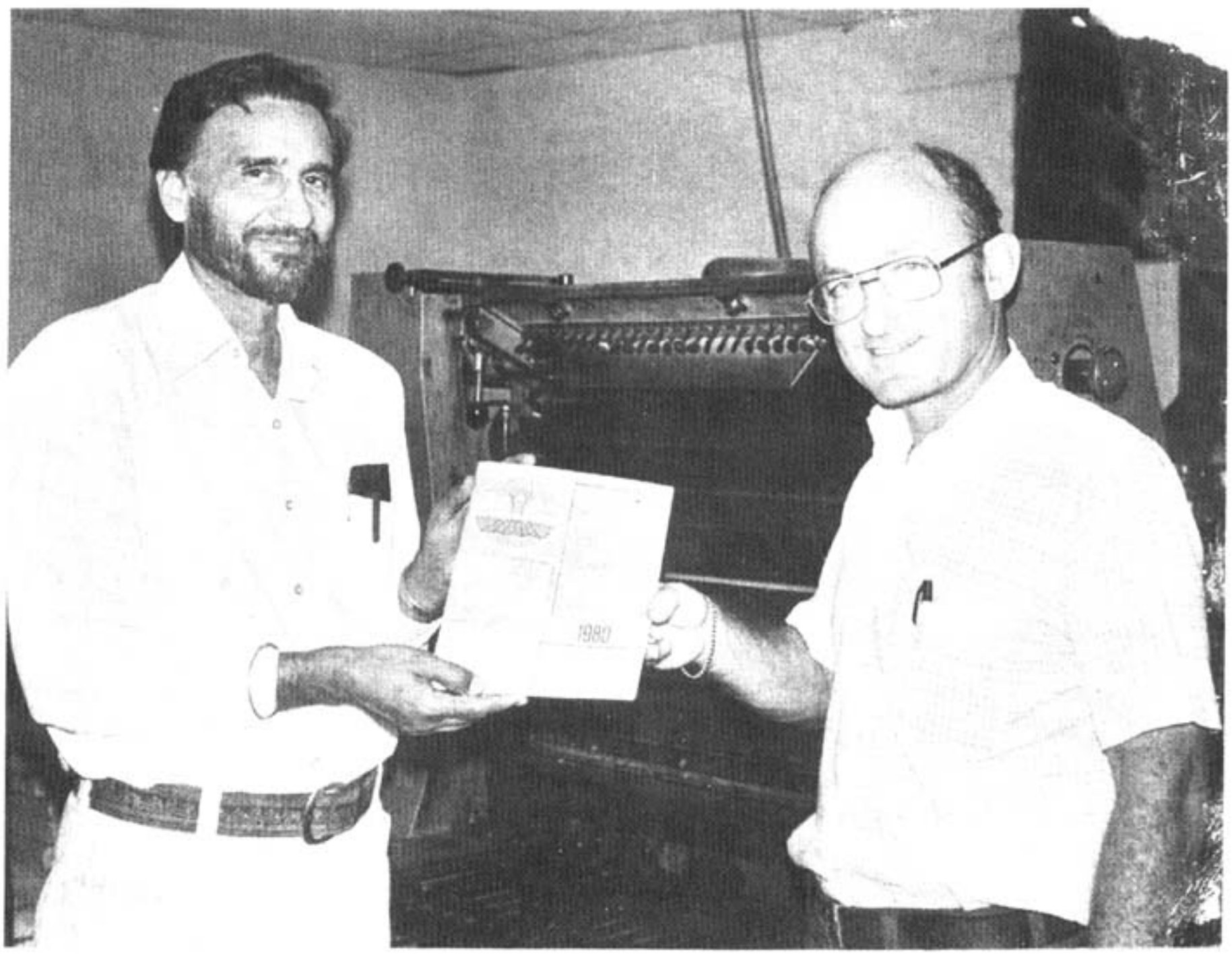
Every year since 1972, I have anxiously awaited and vigorously participated in the activities surrounding the fairs. I take great pride in having played a vital role in the development of the Fair as a partnership between VIDA and the University of the Virgin Islands. When I moved to UVI in July 1974, I continued my active participation in the Fair - first as the Editor of the Fair books, which took the shape of a professional journal, and later as an Executive Vice President.

As my journey as a professional agriculturist comes to an end in 1996, I look back with fond memories to my relationships with the various Commissioners of Agriculture, namely Rudolph Shulterbrandt, Oscar E. Henry and Patrick Williams, Department of Economic Development and Agriculture Commissioner Eric E. Dawson and Assistant Commissioner Larry Bough. I must admit that I was extremely lucky to maintain a fruitful working relationship with each of them.

I am very proud of the Fair and have constantly promoted it as a community event to be enjoyed by all Virgin Islanders. However, I am most proud of two things: my role in the development of the Fair as a joint venture between the V.I. Department of Agriculture and the University of the Virgin Islands. The major step in this direction was taken under the governorship of the late Cyril King, who called Commissioner Henry and CVI President Dr. Lawrence C. Wanlass together and gave them the charge of developing a close collaboration between these two entities and promoting agricultural programs in the territory. This started the partnership for the sponsorship of the annual Agriculture and Food Fairs, which we all witness today. The University chief executive officers since Dr. Wanlass, UVI President Emeritus Arthur A. Richards and President Orville Kean, have continued to strongly support the University's participation in this community activity.

The Land-Grant Programs are showcased annually at the Agriculture and Food Fairs. As the principal agency responsible for carrying out the outreach mission of the University, the Cooperative Extension Service has extensive exhibits and demonstrations in beef, dairy and small livestock production, soil and water conservation, integrated farm and pest management, urban gardening, environmental education, home economics, foods and nutrition education and 4-H and youth development. The research mission of the university are carried out by the Agricultural Experiment Station where basic and applied research are conducted on the development of food and feed production and the preservation of natural resources in the Virgin Islands. The results of ongoing research projects in aquaculture, horticulture, animal science and agronomy are highlighted annually at the Agriculture and Food Fair, as well.

The second achievement I am equally proud of is my role in the development of the agriculture leadership in the territory. The current three administrators in the VI Department of Agriculture- Commissioner Arthur C. Petersen, Jr., Assistant Commissioner Louis Petersen, and Deputy Commissioner Lawrence Lewis - have worked with me and I consider them like my graduate students. The Virgin Islands are very fortunate to have this great team of young professionals under the able leadership of Dr. A. Petersen to develop the food and agriculture industry in these critical times. Equally competent and committed are the professionals, who all were recruited and trained during my tenure as head of the Land-Grant Programs of UVI. Between VIDA and UVI, we have a team that is second to none in the world. I am very proud to have played a major role in developing this team and eagerly look forward to seeing their achievements.x



Dr. Darshan S. Padda and Doug Burns with the first issue of the 1980 Fair book.

The Need For Trees

by
Rudy G. O'Reilly, Jr.
Extension Agent
UVI Cooperative Extension Service

Most of us realize that trees are important in one way or another. Why else would there be so many of them? Fruits and shade are perhaps the most obvious benefits that trees provide. Some of the trees that grow wild in our forests are not known for their edible fruits. One such tree is the Iron wood (*Krugiodendron ferreum*), a tree slowly becoming recognized as an ornamental. According to Julia Morton in her book "Wild Plants for Survival in South Florida," the fruits have a juicy, sweet flesh. A tree like this could serve as both a fruit and an ornamental tree.

By using such trees as part of the landscape we not only protect the genetic stock of native

plants, but also provide additional habitat for some animals that depend on them. In most cases, native plants also require less attention than exotic ornamentals, since they are best suited to our climate and soils.

Trees are more intimately connected to their environment than are animals. They can not move to more favorable areas when conditions become less than tolerable. Instead, they must remain and adapt, ever so slowly through natural selection, to an environment that is constantly changing from both natural and man-made influences.

Under normal conditions, the trunks and roots of well-established mangrove forests help filter sediment and other debris from fresh water before it enters the ocean. The roots of the red mangrove also serve as nurseries for oysters and young fish. The nutrient-rich waters around mangroves support various smaller organisms that fry can feed on within the protection of the mangrove roots. Without mangroves fish populations would decline and offshore reefs would become threatened by excess silt.

The roots of trees and other plants help prevent erosion by holding soil in place as water runs by. Leaves high up in the canopy also help reduce erosion by breaking the force of rain as it falls. A single rain drop can splash soil particles seven to fifteen feet from the point of impact. Leaves within additional canopy layers in a mature forest ensure very little disturbance to the soil, even in heavy rain. Unprotected or poorly protected soil erodes much faster, not only from the impact of the rain, but also from the resulting run off. As more trees and underlying plants are removed, tons of top soil is being lost. This top soil ends up in the guts and eventually into the ocean, since the few mangroves at the ends of the guts can not handle the excess sediment. In well-planted areas rain has a chance to percolate into the soil and the water table, instead of simply running off.

Some members of the older generation remember the days when they learned to swim, or caught fresh water shrimps (cribishi) and mullets in our guts. Even I remember, just about 25 years ago, seeing those fish under the bridge at the annual Agriculture and Food Fair. But no longer do our guts run with water as before or do our ponds overflow at the peak of the rainy season. Yet, rainfall data from 1852 to the present indicate no decline in the average yearly rainfall. Where has the water gone? We are more dependent on trees and other plants than we think or would care to admit. The very essence of our existence, of our evolution, is dependent on trees. The air we breathe, the food we eat, the clothes we wear, the medicines we take, and of course the lumber for our homes are all derived either directly or indirectly from plants. They certainly do not need us for their survival, but we do need them for ours. ✖

Fresh water shrimps and mullets were frequently seen in many guts and streams throughout St. Croix.

Meeting The Challenges With Drip-Irrigation

by
Stafford M.A. Crossman
Research Specialist
UVI Agricultural Experiment Station

Water is a critical resource for both human survival and agricultural production. Competition for its use is increasing due to rapid population growth and economic development. As this competition for limited water resources increases, it is obvious that technologies like drip-irrigation must become a feature of crop production in the U.S. Virgin Islands.

The concept of drip-irrigation, while seemingly new, has been around for over 100 years. Drip-irrigation is an important method of applying water to crops in many areas of the world, particularly in areas where a high level of competition exists for available water resources. The very precise application rates associated with drip-irrigation systems results in a dramatic reduction in water usage (of up to 80 %) compared to other irrigation methods. This benefit is extremely important for vegetable producers trying to grow their crops in urban areas, and areas where water for agriculture is expensive or available in inadequate supplies.

This form of irrigation technology conserves water and improves crop growth. Drip-irrigation offers the potential for increasing yields, while reducing water costs/use. Water is precisely delivered at controlled application rates through small plastic tubes with small orifices or drip-type emitters that are placed near rows of plants. The water is applied at a low, flow-rate in small, frequent amounts as required for optimum plant growth.

Major components of a drip-irrigation system are the main-lines, sub-mains, laterals and emission devices. These components are comprised of combinations of PVC pipes, poly-hose, and drip tape each with their variety of fittings.

In the Virgin Islands, the choices of water sources for crop irrigation are municipal water, cisterns, wells or surface water from dams or ponds. Water source and quality determine the magnitude of filter requirements. The filter is the heart of the drip irrigation system. Clogged emitters will not irrigate properly. If well water is used, the filtration job can often be done with screen filters. Good filtration is essential to eliminate clogging of the drip tape. The sensitivity of an emitter to clogging depends to a large extent on the dimensions of the flow passages. Generally, large flow passages result in less clogging. High-flow drip tape is roughly defined as having a tape discharge rate of 0.4 gallons per minute per 100 feet or greater. A low-flow tape is defined as having a discharge rate of about 0.2 - 0.3 gallons per minute per 100 feet for the same emitter spacing. An advantage of high-flow tape is that the large flow passages of the emitter can reduce clogging problems.

Screen filters should be checked periodically for screen integrity and replaced if they appear weak or torn. Periodically, follow along the irrigation laterals while the system is operating, checking for cuts and other damage from implements and animals. Also, check for leaks from lateral ends or if emitters are functioning properly. Immediately repair any problems found.

Lines should be flushed periodically. The time between flushes will vary depending primarily on the water source and filter maintenance. The system must be capable of sustaining pressure while being flushed in order for the flush to be most effective. Open a few laterals furthest from the source and catch the water in a large (1/2 to 1 gallon) jar.

If the water appears cloudy, or if particles settle at the bottom, then systematical open a few laterals at a time and flush the entire system. Flush each line until the water runs clear. Periodic flushing of laterals is required to remove any deposited materials and greatly reduce emitter clogging from insoluble particulate matter and/or accumulated bacterial activity.

The small orifices of low flow emitters can readily be clogged by poor water quality if the drip-irrigation system is not properly designed and managed. Clogged or partially clogged emitters will reduce the uniformity of water application thus reducing the uniformity of plant growth and reducing yield.

Water used for drip systems should be filtered to remove sand and organic impurities. The tiny emitters and orifices - as small as 0.02 inches - can become clogged by unfiltered water. Therefore, filters are essential to the operation of a drip system and may be viewed as the most important component. Screen filters can be used for wells and municipal water. If not specified by the tape manufacturer, the screen filter should be able to remove particles 1/10 the size of the orifice opening.

The more recent drip tubing products have turbulent flow emitters incorporated in their design. They are extremely uniform and much more resistant to clogging than the older laminar flow type products.

A key component of most drip-irrigation systems is the drip tape, which conveys and emits the irrigation water along the length of the rows. Drip irrigation tubing discharges water from small emission points or orifices. Proper selection of drip tape is vital to the uniform distribution of irrigation water and adequate application rates. Tapes are usually available in wall thicknesses ranging between 4 and 25 mils. The thin-walled material is commonly used by growers in the U.S., who discard the tape after each crop. Many growers use 8 to 10 mil tape, but 15 mil tape is also very popular. Experience with the 15 mil tape has demonstrated that it is suitable for use in the Virgin Islands. This tape can be used over a number of growing seasons, if care is taken to avoid mechanical damage or clogging of the emitter orifices.

The tape flow rates depend on the emitter discharge characteristics and the emitter spacing. The tape flow rates are expressed in gallons per hour per individual emitter, or gallons per minute per 100 feet of tape length. Tubing discharge per emitter can be converted to tubing discharge per unit length or per unit area. Tape flow rates are related to a certain operating pressure. The larger the emitter spacing, the smaller the tape discharge rate for a given emitter characteristic. A wide range of emitter spacings are available in drip tape usually up to 24 inches, although larger spacings are available. Spacings commonly used for vegetable crops are between 8 and 18 inches. Choice of emitter spacing should be based on plant spacing and expected root distribution.

Recommended operating pressures depend on the wall thickness of the drip tape. Several manufacturers recommend a maximum continuous pressure of about 15 psi for 15-mil tape, and 8 to 12 psi for lesser thicknesses. If the recommended maximum continuous pressure is exceeded the drip tape will rupture. In order to prevent this, pressure regulating devices are included in the system design. These devices are available at preset pressures or variable to be adjusted by the user.

The emitter discharge rate depends upon the pressure. Thus, changes in pressure throughout the irrigation system will vary the discharge rates throughout the field, except in the case of pressure-compensating emitters. Pressure changes can be caused by elevation difference or friction losses in pipelines. Some types of emitters are more sensitive to pressure changes than others. The sensitivity of an emitter discharge rate to pressure changes is described by the emitter discharge exponent. This exponent is calculated from emitter discharge rates

measured at several pressures. The exponent ranges in value between zero and one. The higher the exponent, the more sensitive the discharge rate is to pressure change. An exponent equal to 'one' means that the emitter is completely sensitive to pressure changes. An exponent equal to 'zero' means that the emitter is pressure compensating or that the discharge rate is not affected by pressure changes. The emitter discharge exponent is a very important factor to consider when irrigating steep and/or undulating slopes and uphill slopes. Pressure changes can be substantial under these circumstances.

Discharge rates of pressure-compensated emitters are unaffected by pressure changes. However, a minimum pressure must be maintained for the pressure-compensating features to work. Some tapes require a minimum pressure of about 4-5 psi for the pressure-compensating feature to operate properly.

The technology involved in the installation and maintenance of a drip irrigation system is now very simple and user friendly. The initial cost of a drip irrigation system is now much cheaper than it was just a few years ago. Interchangeable components are easily available to fit the specific requirements of growers, whether they are backyard gardeners or large scale producers. ×

REFERENCES

Daudet, G. 1993. Low-flow irrigation: System maintenance from the inside out. Irrigation Journal 43(7): 18:22.

Hanson, B.R. 1994. Adhering to the rules of drip tape selection. Irrigation Journal 44(5):8-13.

Hanson, B., Fulton, A., Munk, D., Bendixen, W. and D. May. 1995. Drip irrigation of row crops: An overview. Irrigation Journal 45(3)8-13.

Roberts Irrigation Products. 1992. Drip irrigation: A measured approach to farming. Irrigation Journal 42(2):8-10.

Sanders, D.C. 1992. Drip irrigation system component and design considerations for vegetable crops. HortTechnology 2(1):25-27.

Smajstrla, A. 1995. Causes and prevention of emmiter clogging in microirrigation systems. Irrigation Journal 45(3):14-17.

Technologies like drip irrigation must become a feature of crop production in the Virgin Islands.

MORINGA: A Multipurpose Tree with Diverse Opportunities for the Virgin Islands

by
Manuel C. Palada, Ph.D.
Research Assistant Professor
UVI Agricultural Experiment Station

Moringa (*Moringa oleifera* Lam.) is one of the amazing trees God has created because of its multiple uses and benefits. It is a perennial softwood tree native to India and known by several names around the world. In India, it is popularly called horseradish tree, ben oil tree, drumstick and sohnja. It is known as benzolive, ben oleifere, and graines benne in Haiti; reseda, ben and jazmin frances in Puerto Rico; palo de aceite in Dominican Republic; marango in Costa Rica; maranga calalu in Honduras; moloko and ben-aile in Guadeloupe; saijhan in Guyana; angela in Colombia; shagarat al rauwag in Sudan; and balunggay or malunggay in the Philippines.

The multiple uses and potentials of moringa have attracted the attention of scientists, development workers and farmers in the major regions of the world. The moringa tree is an important crop in India, Ethiopia, Sudan and many countries in Asia and Central America, where its parts, from roots to seeds, are used for industrial, food and medicinal purposes. In the Virgin Islands, the potential use of moringa as a windbreak and in agroforestry systems is being studied at the Agricultural Experiment Station.

Moringa grows in climates ranging from subtropical dry to moist through tropical very dry to moist forest zones. It tolerates annual rainfall of 5 to 40 cm, annual temperature of 19 to 29°C and soil pH of 4.5 to 8. It is drought tolerant and survives in subtropical climates, flowering and fruiting freely and continuously. Although moringa originated in India, it is widely cultivated or naturalized in several countries in the tropics including the Virgin Islands and the rest of the Caribbean. The tree is characterized by its drooping leaves, brittle stems and branches with corky bark (Fig. 1). The leaves are compound, tripinnate with 3 to 9 leaflets. The flowers are fragrant, white or creamy white with yellow stamens. The tree produces pods which are pendulous, triangular and tapering at both ends. The pod contains about 20 seeds embedded in the pith. Seeds are dark brown with 3 papery wings. The tree flowers all year round and produces pods and seeds throughout the year regardless of the amount of rainfall received.

CULTIVATION

Moringa can be propagated by planting stem cuttings or by seed. Cuttings of 1 to 2 meters root very easily and are usually preferred. Furthermore, cuttings of fairly large size, planted in moist soil, root readily and grow to sizeable trees within a few months. At the experiment station, trees are raised from seeds and, once established, grow rapidly. For good establishment, cuttings and seedlings should be planted during the rainy season when the soil is moist. If this is not possible, plants should be irrigated or watered for several weeks after planting. Depending on the purpose for which it is grown, moringa can be planted at various spacings. A solid stand of moringa can be planted at a spacing of 3 to 5 m both between and within rows, and watered until the plants are well established. If moringa is grown in hedgerows for windbreak, spacing between plants within rows may vary from 1 to 5 m. Regular irrigation and manuring is seldom practiced; but it is

advisable to apply manure or compost in trenches dug about 10 to 20 cm away from trees during the rainy season. This practice is said to promote high yields of leaves and pods. Regardless of the planting material used, trees bear pods in 6 to 8 months after planting. The yield is generally low in the first 2 years, but from the third year onwards a single tree yields 600 or more fruits per year.

UTILIZATION

Moringa has numerous uses including culinary(food), agronomic or horticultural, medicinal and industrial. Some examples of how moringa is used are as follows:

1. Culinary Uses - Almost every part of moringa is said to be of value for food. In the Philippines, recipe pamphlets have been published on how to cook moringa (see sample recipes in Appendix B). The leaves of moringa are high in vitamins A and C, and a cupful of leaves provides more than the recommended daily allowance (Table 1). They have the general characteristics of a leafy vegtable rich in calcium and iron and a very good source of phosphorus. The leaves are eaten as greens, in salads, in vegetable curries, as pickles and for seasoning. The leaves are a good substitute for leaf spinach or cocoyam leaves as ingredients in the local dish of "kalalloo." The young pods have the general characteristics of a succulent vegetable but are rather high in protein. In Southeast Asia, the young pods are cooked as a vegetable. The seed is said to be eaten like a peanut in Malaysia. The thickened roots are used as substitute for horseradish, a popular spice in Asia and Africa. The flowers are said to make a satisfactory vegetable which is interesting particularly in subtropical places like Florida, where it is said to be the only tree species that flowers every day of the year. The tree is also good for honey production since bees are very attracted to its flowers.

2. Agronomic and Horticultural Uses - Moringa has several agronomic and horticultural uses. Perhaps the most common use is when it is planted in hedgerows or field borders serving as a living fence or providing windbreak. In some parts of Southeast Asia, the tree is used to support cultivation of climbing crops such as yams, pole beans and black pepper. In India and Indonesia, moringa leaves are used as animal fodder. In certain parts of Ethiopia, leaves and young branches are browsed and relished by livestock. Moringa leaves in combination with leucaena are excellent feeds for swine in Haiti. In the Philippines, the roots are used as nematicide and leaves are known to prevent damping-off disease of seedlings. In Latin America, the USA and Africa, moringa is grown as an ornamental tree adding aesthetic value to the landscape. The potential of moringa in agroforestry and sustainable agriculture is being investigated at the UVI agricultural experiment station. Moringa is grown in hedgerows along with other species such as leucaena (tan-tan), gliricidia and pigeonpea for comparison. Moringa is second to leucaena in total dry matter production and higher than gliricidia after 2 years of growth. Moringa also exhibits the fastest regrowth (comparable to leucaena) after pruning. However, it is highly competitive to vegetables like eggplant and sweet corn when these crops are planted in alleys between moringa hedgerows, reducing yields by more 50 percent. Application of moringa prunings adds organic matter and improves soil fertility.

3. Medicinal Uses - Moringa is reported to have many medicinal properties including: abortifacient, antidote (centipede, scorpion, spider poison), bactericide, diuretic, ecbolic, estrogenic, expectorant, purgative, rubefacient, stimulant, tonic, vermifuge and vesicant. Most of the plant parts have medicinal values. The flowers, leaves and roots are used in folk remedies for tumors, and the

seed for abdominal tumors. Two alkaloids, moringine and moringinine, are present, the latter being responsible for many of the medicinal uses of the plant. In Nicaragua, the root decoction is used for dropsy. Root juice is applied externally as rubefacient or counter-irritant. The leaves are applied as poultice to sores, rubbed on the temples for headaches, and said to have purgative properties. The bark, leaves and roots are acrid and pungent, and are taken to promote digestion. Oil from moringa seed is somewhat toxic if taken internally, but is applied externally for skin diseases. For example, in Guatemala aqueous extract of moringa seed is effective against skin infecting bacteria *Stphylococcus aureus* and *Pseudomonas aeruginosa*.The bark is regarded as antiscorbic and exudes a reddish gum with properties of tragacanth, sometimes used for diarrhea. The root bark has aphrodisiac qualities. It is used against intestinal worms and to reduce all sorts of aches. It causes a burning sensation,biliousness and improves appetite.It is also given to prevent enlargement of the spleen, tuberculous glands in the neck, to destroy tumors, ulcers, ear aches and shuttering of ear. The stem bark is known to remove all kinds of pain. It is said to be a fattening agent, useful in curing eye diseases, an aphrodisiac and anthelmentic.

4. Industrial Uses - Moringa seeds yield 38 to 40 percent non-drying oil known as Ben oil. Ben oil is used in arts and for lubricating watches and other delicate machinery. The oil is also used in the manufacture of perfumes and hair dressings. The wood yields a blue dye. The bark can serve for tanning and yields a coarse fiber. Trees are being studied as pulpwood sources in India. Analysis indicates that the tree is a suitable raw material for producing high alpha-cellulose pulps for use in cellophanes and textiles. In rural Sudan and Malawi, powdered moringa seeds are used to purify drinking water by coagulation. The powder is toxic to guppies, protozoa and bacteria. The toxic effects to bacteria, guppies and protozoa are believed to be due to a glycosidic mustard oil. The toxin seemed not to be a danger to the health of man in the concentration present during the use of the seeds for nutrition, medicine, or water purification.

ECONOMIC OPPORTUNITIES

As a multipurpose tree crop, moringa has commercial potential for the Virgin Islands. It is highly adapted to the climate and growing conditions of the Virgin Islands. The tree is drought tolerant and survives the long dry season and semi-arid climate of the islands. It is not bothered by insect pests or diseases. Because of its year round production of leaves, pods, flowers and seeds, there is a continuous supply of raw materials for its many uses. Among the many uses of moringa, perhaps the important ones are its medicinal and industrial uses. As an exotic specialty vegetable crop, moringa has a potential market for the growing ethnic population in the major cities of the USA and can be a major source of income for farmers in the Virgin Islands. As a fast growing tree crop, it can be planted for windbreak protecting vegetable and orchard farms as well as other farm structures and properties.

Note: Seeds of moringa can be obtained free from UVI Agricultural Experiment Station. Contact Dr. M.C. Palada at 692-4086.

REFERENCES

Aykroyd, W.R. 1966. The nutritive value of Indian foods and the planning of satistifactory diets. Indian Council of Medical Research. New Delhi, India. pp. 55, 61, 91, 97.

Benge, M.D. 1987. Moringa: A Multi-purpose Vegetable and Tree that Purifies Water. Science and Technology/ Forestry, Environment, and Natural Resources Technical Series #27. USAID, Washington, D.C. 234 p.

Brown, W.H. 1950. Useful Plants of the Philippines. Vol. 2. Technical Bulletin 10. Bureau of Science. Manila, Philippines.

Xaulanda Simmonds, Miss St. Croix, presenting Governor Schneider with a beautiful fruit basket.

Fig. 1. A ten-year old Moringa tree at Mary's Fancy on St.Croix.

Fairgoers enjoyed the performances by King Derby and his Jr. Calypsoians.

APPENDIX A

Table 1. Composition of leaves and pods of Moringa oleifera per 100 g of edible portion.

Component	Leaves	Pods
Edible portion (%)	75	83
Moisture (%)	75	87
Protein (g)	6.7	2.5
Fat (g)	1.7	0.1
Carbohydrate (g)	13	3.7
Minerals (g)	2.3	2.0
Fiber (g)	0.9	4.8
Calories	92	26
Calcium (mg)	440	30
Magnesium (mg)	24	24
Oxalic acid (mg)	101	101
Phosphorus (mg)	70	110
Potassium (mg)	259	259
Copper (mg/g)	1.1	3.1
Iron (mg)	7	5.3
Sulphur (mg)	137	137
Vitamin A (I.U.)	11,300	184
Choline (mg)	423	423
Thiamine (mg)	0.06	0.05
Riboflavin (mg)	0.05	0.07
Nicotinic acid (mg)	0.8	0.2
Vitamin C (mg)	220	120

APPENDIX B. Recipes with Moringa Leaves and Pods

The following are some ways to cook moringa leaves and pods. These recipes have been tested at the Recipe and Menu Testing Laboratory and chemically analyzed in the Food Research Division of the Food and Nutrition Research Center, National Science Development Board, Manila, Philippines:

Picadillo with Moringa

2 tbsp.cooking oil
1 tsp.minced garlic
2 tbsp.sliced onion
1/2 cup chopped tomatoes
4 cups rice washings
2 tsp.salt
dash of pepper
3 cups moringa leaves, washed and sorted

Saute garlic, onion, and tomatoes. Add ground beef. Cover and cook 5 minutes over low heat. Add rice washing and bring to a boil. Season with salt and pepper. Add moringa leaves. Cook 5 minutes longer. Six servings.

Moringa Leaves Gulay

1	cup coconut milk diluted with 1 cup water
1	cup dried banak (fish) boiled, flaked and fried in 1 tbsp. cooking oil
2	segments garlic, minced
1	medium onion, sliced, 1/8 tsp. salt
6	cups moringa leaves, washed and sorted
4	pieces hot pepper, crushed

Boil coconut milk, dried fish, garlic and onion for 10 minutes. Season with salt stirring the mixture continously. add moringa leaves and crushed hot peppers. Cook 5 minutes longer. Serve hot. Six servings.

Sauted Moringa Pods

2	cups young moringa pods (10)
2	tbsp.cooking oil
1	tsp. minced garlic
2	tbsp. sliced onion
1/2	cup sliced tomatoes
1	cup boiled pork, diced
1/2	cup shrimp, shelled and sliced lengthwise
2 1/2	cups shrimp juice and pounded heads of shrimps
2	tbsp. shrimp paste
1	tsp. salt
1	cup fresh lima beans
1	cup green beans, cut into 1 1/2 inch

Cut moringa pods lengthwise into 4 pieces. Slice white pulp including tender seeds. Discard outer covering. Cut pulp into 1 1/2 inch lengths. Saute garlic, onion, and tomatoes. Add pork and shrimp. Cover and cook for 10 minutes. Six servings.

Mungbean Guisado With Moringa

4	tbsp. cooking oil
1	tsp.minced garlic
2	tbsp. sliced onion
1/2	cup sliced tomatoes
1/2	cup sliced boiled pork
1/2	sliced shrimp
1/2	cup mungbeans, boiled
1/2	cup shrimp juice
1/2	cup pork broth
3	cups water
4 1/4	tsp. salt
	dash of pepper
3	cups moringa leaves

Saute garlic, onion and tomatoes. Add pork and shrimp. Cover and cook for 3 minutes. Add mungbeans, shrimp juice, pork broth and water. Cover and bring to a boil. Season with salt and pepper. Add moringa leaves and cook for 5 minutes longer. Six servings.

Mr. Mitchell's giant cassava roots were prize winners in 1985.

Agriculture--Its Economic Impact On The Virgin Islands

by
Olasee Davis
Extension Specialist
UVI Cooperative Extension Service

Historically, the agriculture fairs were held during the 1930's and 1940's at the former Agriculture Experiment Station at Estate Anna's Hope. In those days, an agriculture fair was called an Agricultural Field Day which attracted thousands of people.

At that time, there was a large number of small farm operators. Roughly speaking, over four hundred family farms operated and produced all kinds of native fruits, vegetables, and ground provisions. In addition, there were large producers who raised large and small livestock such as goats, sheep, cattle, swine, and poultry.

The farmers looked forward to these "Field Days" because they were, as today's fair, highlights of the year and occasions when residents could get first-hand exposure to what the farmers produced.

Somehow, the agriculture fairs were discontinued until 1971 when they were re-established at the Estate Lower Love Agriculture Station. The year the Agriculture and Food Fair started again, former Governor Melvin H. Evans made this statement:

'Although the passing years have dimmed the importance of farming here, and the fields of cultivated sugarcane have vanished from the scene, the soil of our native land is still a precious possession. The farmers who have remained close to the earth must be admired for their appreciation and understanding of the more basic values of life. Their yields are not only a material reward of such endeavors, but also the spiritual and aesthetic benefits.'

Mr. Rudolph Shulterbrandt, one of the founding members of the Agriculture and Food Fair and former Commissioner of Agriculture, also stated in 1971, "We who love the field of agriculture, are also challenged to keep our fields of livelihood alive on our islands. We have many problems, but these are not too different from the problems of our neighbors near and far."

He further stated, "our neighbors too are challenged by adverse weather: too cold, too hot, too wet, too dry. They are also challenged by adverse conditions of soils: too acid, too alkaline, too little drainage, too much drainage, soil borne diseases, nematodes."

Since 1971, the agriculture industry on St. Croix has grown mainly in the area of livestock production. The Senepol cattle industry has expanded to the point where these special breed of animals are exported all over the world. The dairy industry on St. Croix has increased also. Today, we have five dairy farms with Windsor Dairy Farm having 400 milking cows. Island Dairies today is one of the most modern, advanced dairy plants in the world, and the only diary in the Virgin Islands that processes natural milk fresh from local farms.

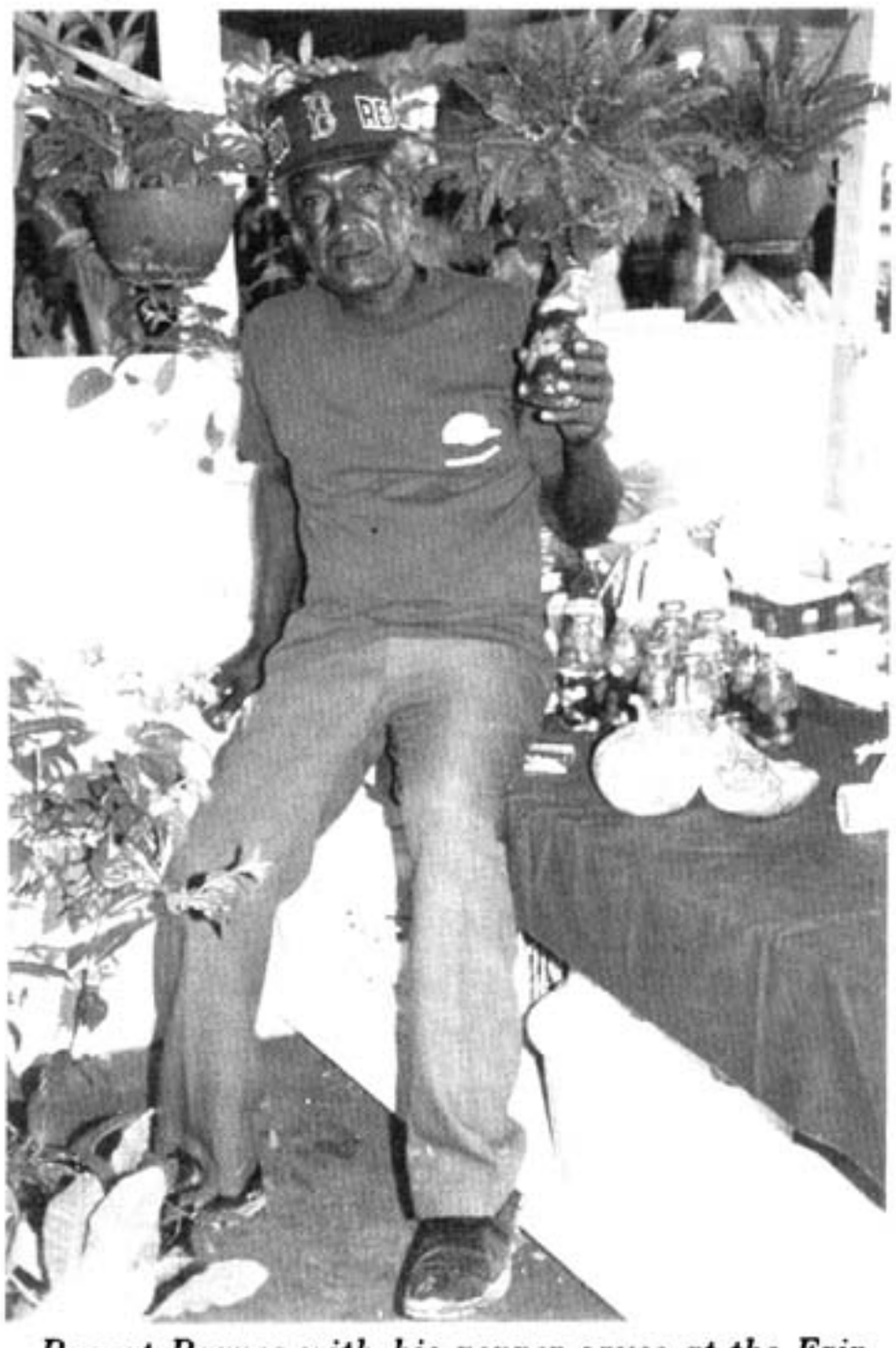
In the mid 1970's, the College of the Virgin Islands, now the University of the Virgin Islands, received land-grant status. This system has three components: the Agricultural Experiment Station, the Cooperative Extension Service, and the Agricultural Teaching Program which leads to an associate of arts degree in agriculture.

The Cooperative Extension Service includes the home economics program, the 4-H Youth Program, and the Agriculture and Natural Resources. These programs have reached thousands of residents throughout the Virgin Islands by publications, workshops, seminars, and on-farm demonstration projects. At the Agricultural Experiment Station, research in

aquaculture, horticulture, animal science, biotechnology and forages has been at the frontline of scientific research on the development of agriculture in the Virgin Islands.

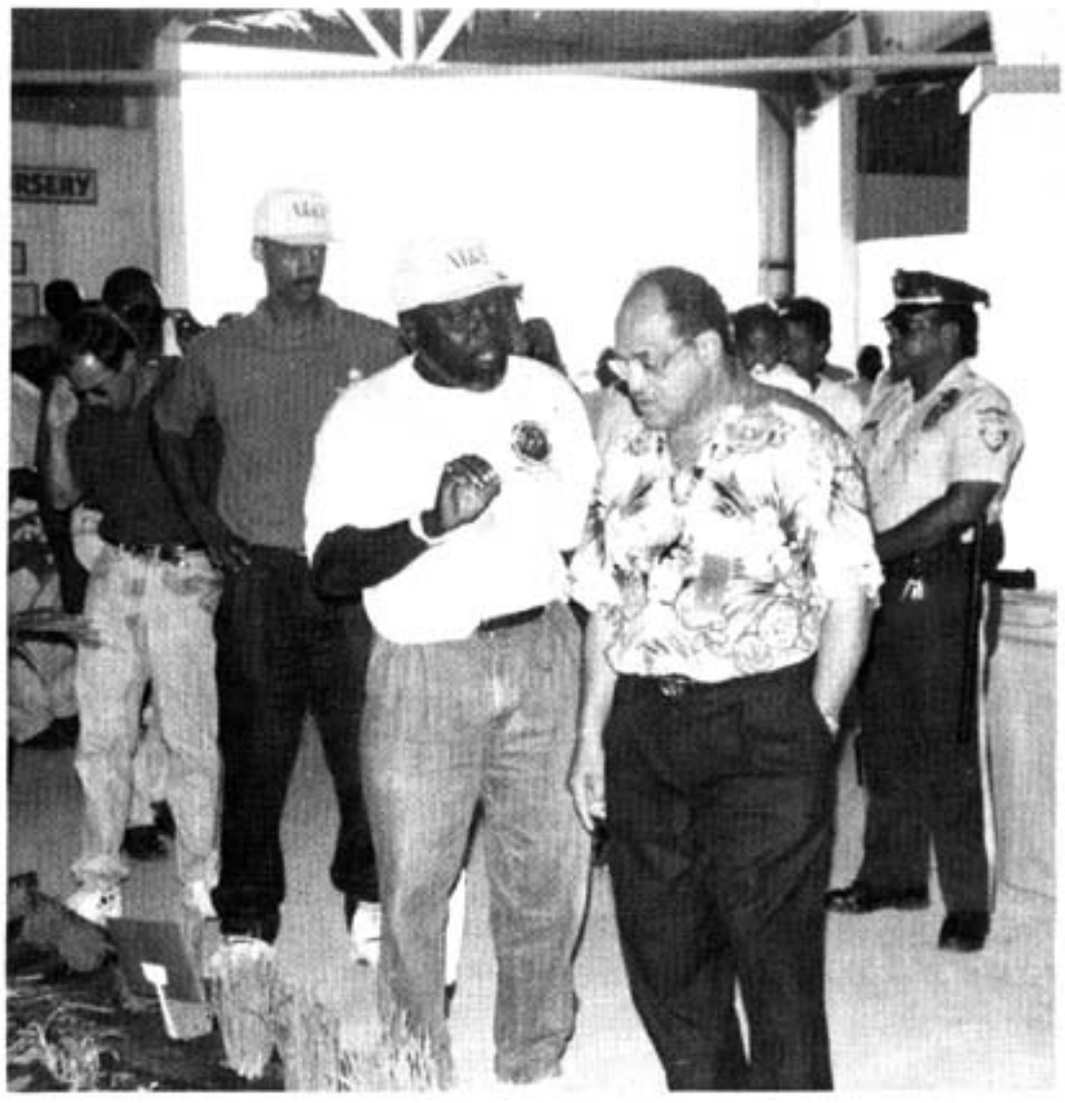
Both the extension and research station technology and information have reached beyond the shores of the Virgin Islands. In the pursuit of agriculture development in these islands, there have been many challenges., from budget cuts in agriculture development to the destruction of two hurricanes within the past six years.

In spite of all these challenges, the opportunities for agriculture in the Virgin Islands are promising because we are forced now to diversify our economy. In this diversification, the agriculture industry has the opportunity to become one of the leading industries in the development of the Virgin Islands economy. In addition, the annual Agriculture and Food Fair is an example of how agriculture can play a major part in economic development.



Rupert Barnes with his pepper sauce at the Fair.

Celebrating Twenty-five Years of Challenges, Changes and Opportunities



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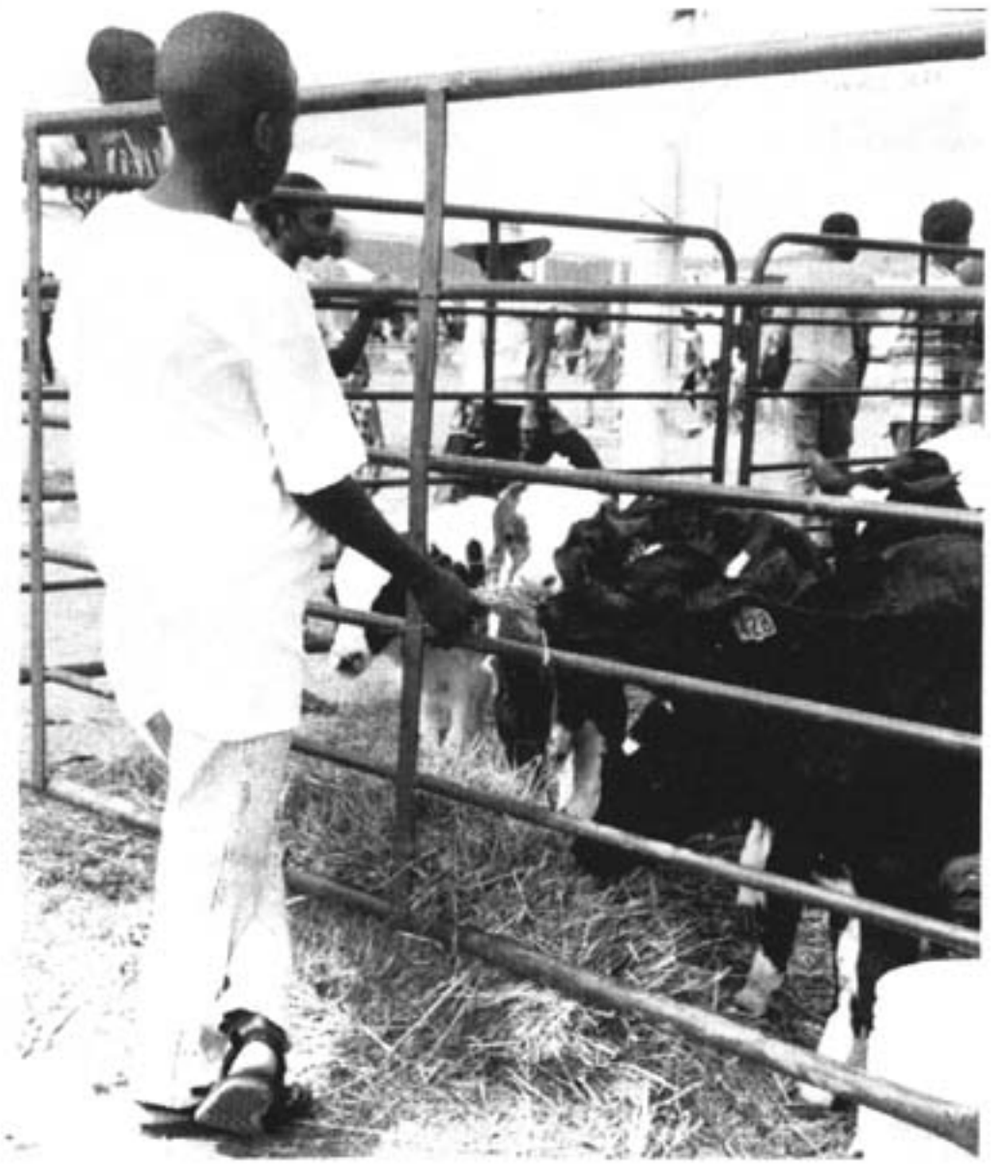


One of the many pleasures that youngsters enjoy at the fair is the opportunity to feed the calves.

The Dubarry family displaying their plants at the 1986 Agfair.

SNAP SHOTS OF AGRIFEST AWARDS

1981 Farm Family of the Year award winners, Jose Torres and his wife, with the late senate president Ruby M. Rouss and Dr. Darshan S. Padda.

Liz Wilson contributed to the success of the Agfair as the editor of the Bulletin in the1980s. Ms. Wilson received an award from Governor Alexander Farrelly for her efforts.

Mr. and Mrs. Ickford Benjamin received the 1993 Farm Family of the Year award. Presenting the award to Mr. Benjamin were Lieutenant Governor Derek M. Hodge and Dr. Darshan S. Padda (left).

Mr. David Schuster (right) receiving the 1994 Agricultural Business Award from former Senator Bingley Richardson.

1986 Farmer of the Year, Albert Edwards, receiving a mahogany clock from former Delegate to Congress Ron De Lugo and Dr. Darshan Padda, UVI Vice President.

Angel Luis Gonzales received the 1992 Farmer of the Year Award from former Lieutenant Governor Derek Hodge.

Rev. Eddie Williams(center) accepting the 1992 Recognition Award on behalf of the V.I. Future Farmers of America from former Senator Bent Lawaetz (right) and Joseph Fulgence, former director of youth activities (left).

Mr. Damien Rodriquez (left) receiving the 1995 Farmer of the Year Award from Governor Roy L. Schneider.

Former Fair Superintendent Eric "Larry" Bough was the recipient of the 1985 Valued Employee Award.

Mr. Henry Nelthropp Sr. (right) receiving the 1994 Distinguished Farm Family of the Year Award from former Governor Alexander A. Farrelly (center).

Mr. Robert Moorehead (left), former Director of the Bureau of Correction, accepting the 1992 Special Recognition Award on behalf of the Anna's Hope Corrections farm.

Olasee Davis receiving the 1993 Environmental Award from former Senator Bingley Richardson.

Commissioner Dr. Arthur C. Petersen Jr. (right) presents former EDA Commisioner Eric Dawson with the 1995 Recognition Award for his contribution to the Agriculture and Food Fair of the Virgin Islands.

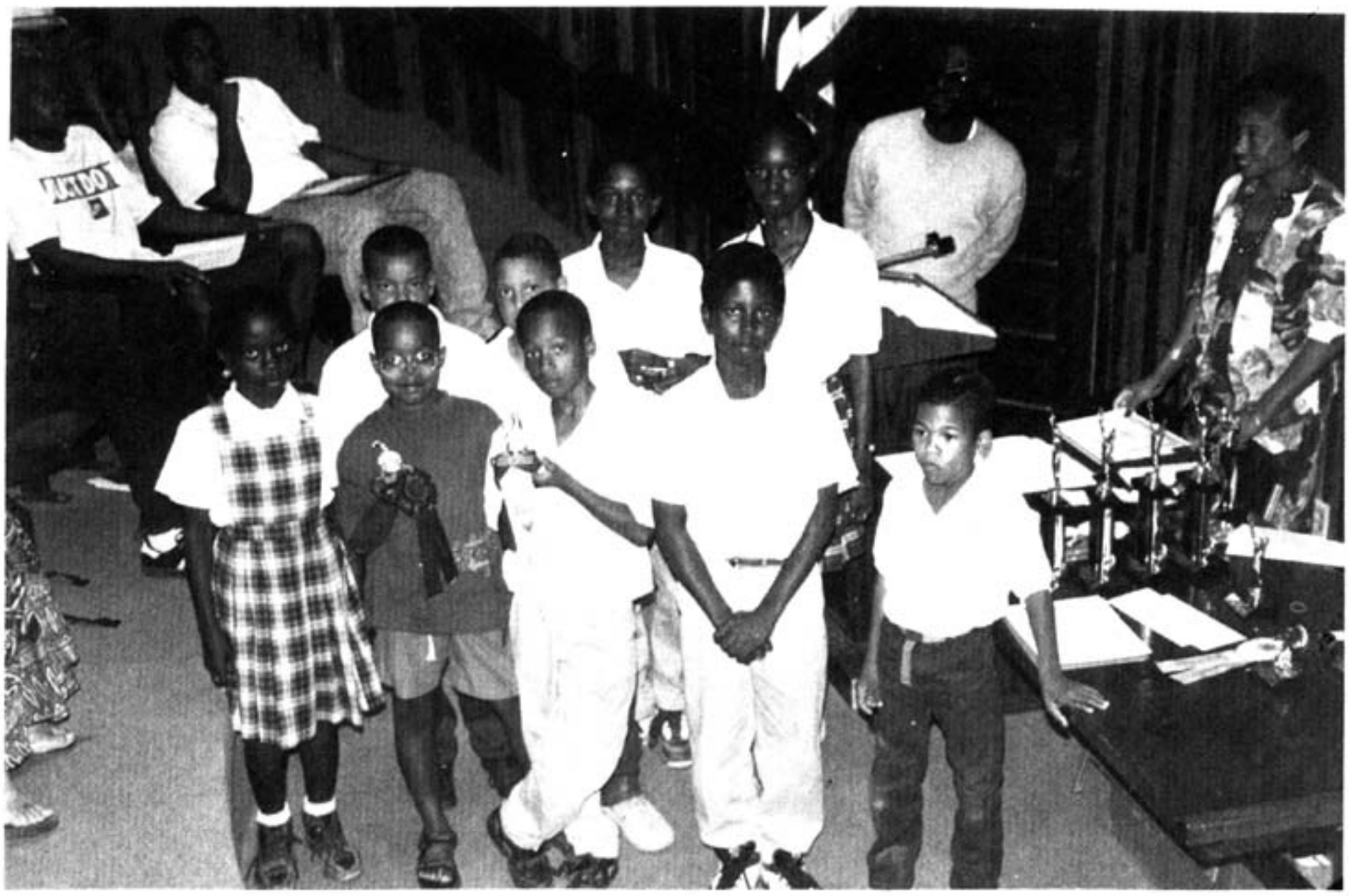
The 1995 Livestock Sweepstake Award was won by Mrs. Colleen Francis-Centeno.

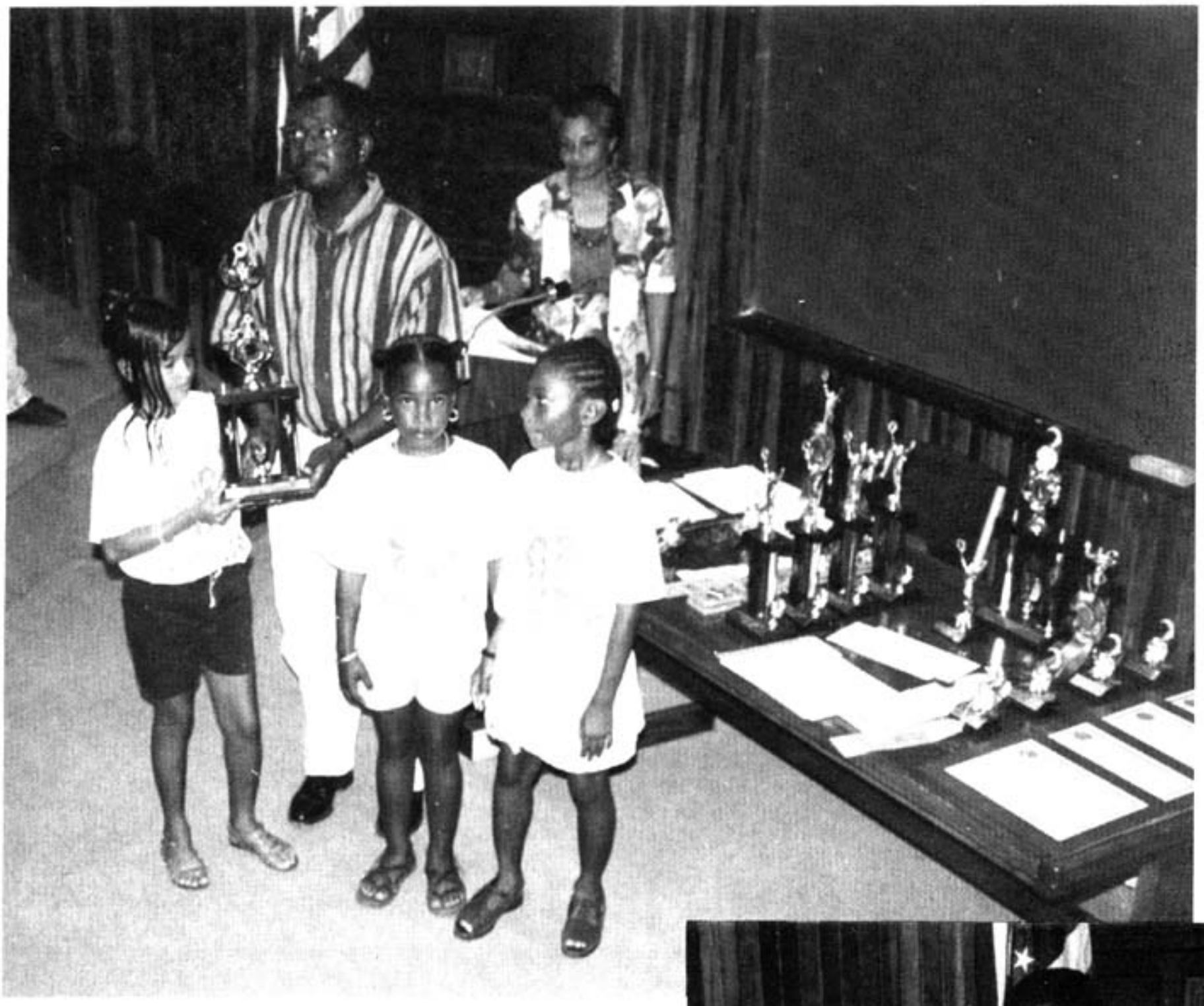
Mr. James Simmonds poses proudly with his trophies that he won for Best Ornamental Exhibits in the 1995 Fair.

For the second year, the Seventh Day Adventist School won first place in the youth garden competition.

Eulalie Rivera Elementary School was awarded a certificate of participation in the 1995 youth garden competition.

YOUTH AWARDS





1981 Winning Recipe

Sweet Potato Pudding
by Gwendolyne Fludd

1	*lb. sweet potato (grated)*
1	lb. pumpkin (grated
1	lb. tannia (grated)
1	coconut (grated)
1	lb. sugar- brown or white
1/4	cup Crisco or shortening
1	tbsp. cinnamon
1	tbsp. mace
1	tbsp. nutmeg
1	tbsp. black pepper

Start by pealing potatoes, pumpkin, and tannia. Wash and grate. After these ingredients are grated, add your spice and mix well, then pour in melted shortening. Place in a greased baking pan and bake at 300° F. for about 1 1/2 hours. You could also add a piece of fat pork. Cooking is done very slowly. Test to see if done by inserting a knife. If knife comes out clean then pudding is done.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Richard A. Schnader, Sr.
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EXHIBITS FROM OUR CARIBBEAN NEIGHBORS

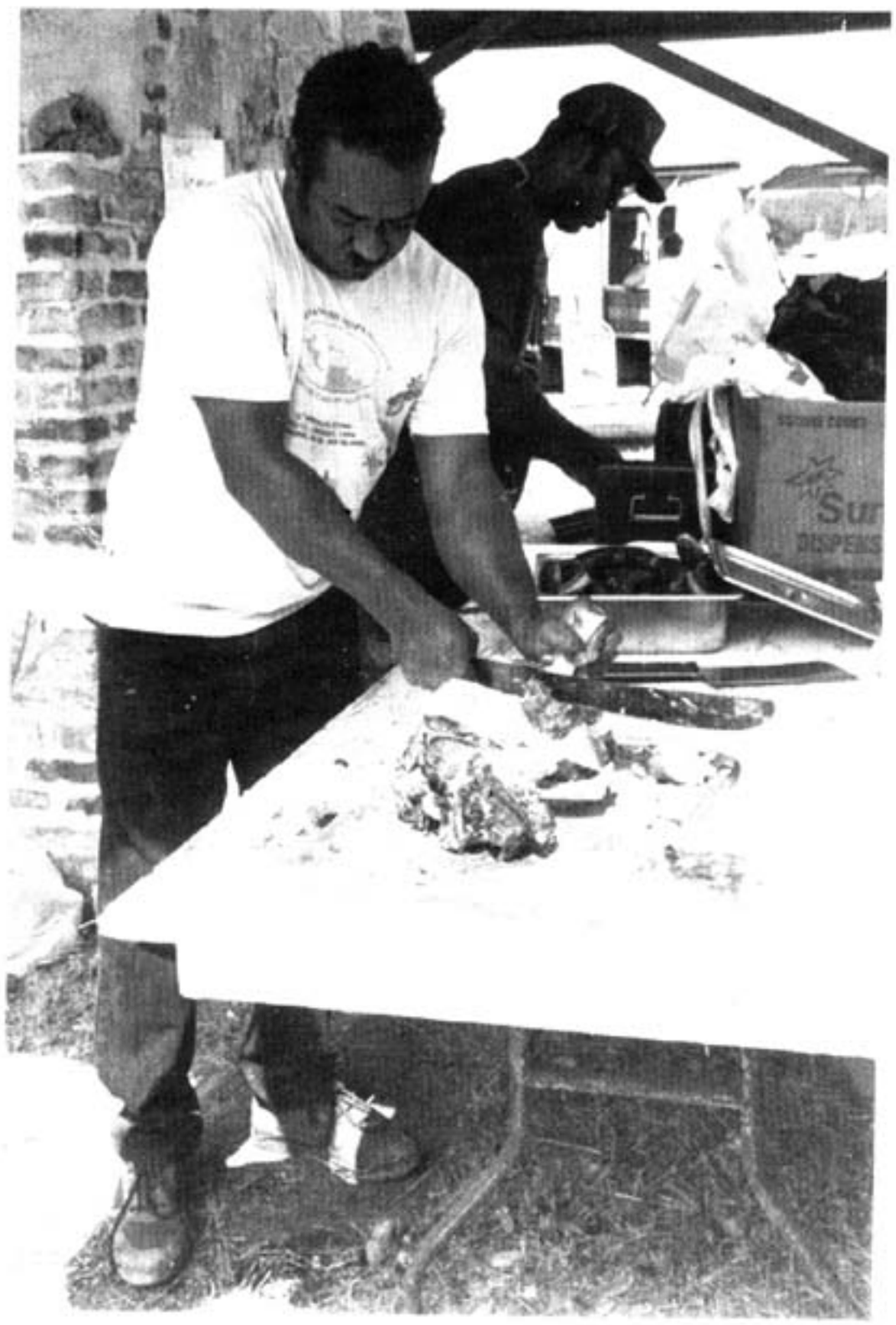
A bountiful display of produce from the Central Marketing Corporation of St. Kitts.

A wonderful display of Carib crafts from Dominica at the 1995 Fair.

Jaw Bone Candies
by Fedelia Harrigan (1981)

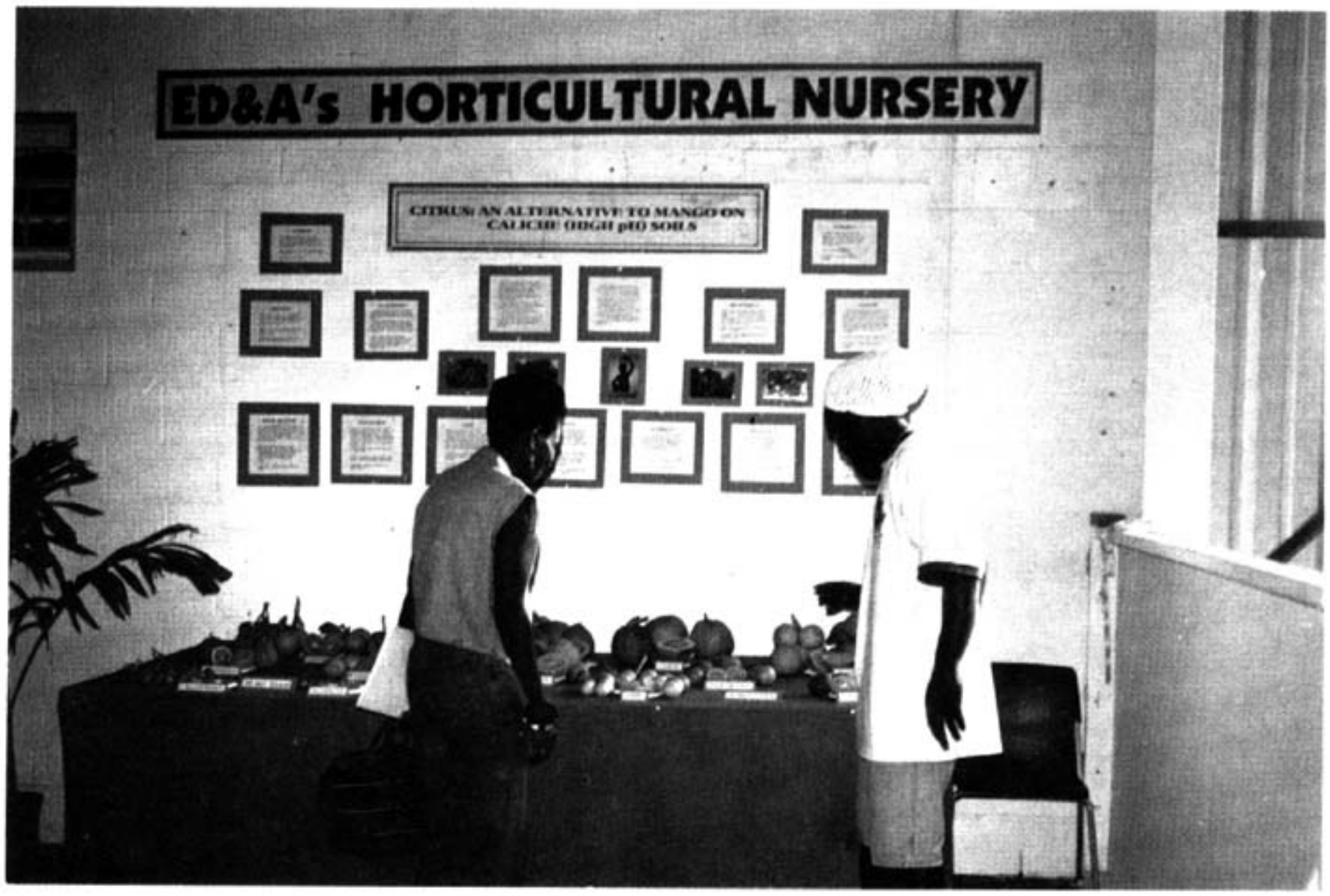
1	tbsp. peppermint oil
5	lbs. sugar
6	pt. water

Bring sugar, peppermint and water to boil. Boil until it reaches 250° F. Then take boiled mix, pour it on a marble stone and roll for about 15 minutes. Nail a 6" nail into a piece of lumber about your height. Take rolled mix from marble stone and hang it on the nail. Pull mix on nail causing it to go around into a circle for about 15 minutes or until mix becomes very smooth. Remove from nail and return to marble stone where it is cut into pieces. Makes 1 1/2 dozen.



Melbourne Petersen and Henry Schuster gave fairgoers a special treat by cooking roast pork in the traditional stone oven.

Sharing a special moment at the 1985 Fair is Rowan Henry and his young Holstein bull.



ED&A's 1995 Horticultural Nursery display of citrus grown in caliche soils.

Locally grown ornamentals from J & S Gardens.

Vienna Cake

by Louise Samuel(1981)

1	cup butter
2	cups sugar
4 to 6	eggs
4	cups flour
3	tsp. baking powder
1 1/2	cup milk
1	tsp.vanilla essence
1	*tsp.almond essence*
4 or 5	preserves
including chopped guavaberry and lime	

Cream butter, add sugar gradually still creaming about 15 minutes. Add eggs, one at a time until light. Sift flour and baking powder and add little at a time with milk and essence while folding. Grease three layer cake pans and bake in oven 350°F. approximately 20-25 minutes. Let cool. Preferable to bake a day before. Slice each layer into two using 4 or 5 flavors of preserve, preferably local green lime, guavaberry, guava jelly or jam, pineapple preserve. Mix each preserve with rum or brandy. Put a layer of preserve between each layer and sprinkle lightly with liquor. Ice cake.

In 1984 the Farmers' Market was named in honor of the late John C. Turnbull.

Chronology Of Major Developments In Forage-Livestock Feeding Systems In The Virgin Islands

by
Martin B. Adjei
Research Assistant Professor - Agronomy
UVI Agricultural Experiment Station

Following the demise of the Virgin Islands' sugar industry in 1966, dairying and livestock (cattle, sheep and goats) production assumed growing dominance within the Agricultural sector of the VI's economy. In addition to dairy cattle, approximately 5,000 beef cattle were maintained on about 3,000 hectares and raised to slaughter weight on grass by 1973. However, it soon became evident that the semi-arid climate induced acute periodic shortages of feed on limited land holdings. Approximately 95 percent of the Virgin Islands' livestock feed grain was imported prior to 1973, and local leadership had a strong desire to supplant feed imports with local production.

Sorghum Silage

Under the collaborative joint leadership of Mr. Oscar E. Henry, former Commissioner of Agriculture and Dr. Darshan S. Padda, former director of the University of the Virgin Islands Agricultural Experiment Station (AES), the sorghum program was initiated in 1976 about the same time that the Senepol beef cattle was also developed. The years 1976 to 1985 saw considerable thrust on UVI-AES grain and forage sorghum research for silage production as a remedy for dry season feed deficit. Suitable sorghum cultivars adapted to the Virgin Islands conditions were identified from replicated field trials and released. These included the Taylor-Evans Silomaker and Yieldmaker, both intermediate varieties, which were capable of producing 10-15 tons of dry forage per acre, yearly, under intensive crop management. Research results made available to local farmers in the form of AES publications included information on land and seed bed preparation; planting date and row spacing; fertilization rates; weed, insect and disease control; and harvesting and storage methods. There was a reciprocal increased response in sorghum crop production for silage by local farmers and an upsurge in beef and dairy output for the Virgin Islands' market. By 1982, the livestock industry on St. Croix consisted of 5,000 cattle (beef and dairy) and 5,000 sheep and goats on 6,000 hectares of farmland.

Despite the earlier successes with sorghum silage conservation, native pastures, dominated by guineagrass and tan tan or leucaena, continued to provide the basic feed resources for the livestock industry of the Virgin Islands. Additionally, the expense to farmers of annual sorghum cultivation, imported fertilizer and pesticide inputs eventually became prohibitive within the context of a growing tourist economy that competed for land and labor in the territory. Therefore, the focus again shifted towards finding ways to improve and manage native grasslands. Guineagrass hay production eventually replaced silage as the forage conservation method in the territory.

Grass Evaluation

The soil-plant-animal system is so complex that it is very difficult to study all its underlying mechanisms simultaneously. Problems faced in forage evaluation are threefold: (1) those largely independent of the effects of animals such as environmental

adaptation and fertilizer trials; (2) those in which the investigator needs to determine the influence of the animal on the sward but does not necessarily need to determine the effect of the sward on the animal, such as measuring the grazing tolerance of several species; and (3) those which can be solved only by evaluation with the animal. Generally, the first two types of problems are studied in relatively small plots, whereas the third problem requires large pastures and numbers of animals.

Notwithstanding the enormity of the task, some progress has been made in pasture and forage research over the past 30 years in the Virgin Islands. In a 5-year experiment beginning in 1966, the effects of nitrogen (N) fertilization (0 vs. 300 pounds N per acre) and harvest frequency (2-, 3-, 4- and 6-month intervals) on yield and chemical composition of guineagrass forage was studied on St. Croix. It was concluded that a 4-monthly harvest interval provided a reasonable compromise between high yield and ease of management on one hand, and high quality of forage on the other hand. The yearly average production obtained with the 4-monthly harvest interval was 8.6 tons per acre of dry forage with a crude protein content of 4.6 percent.

Several attempts have been made since 1969 to identify more drought tolerant and persistent alternative forage grasses to guineagrass. The evaluation criteria included an assessment of mode of propagation, ease of establishment, reproductive capacity, rapidity of ground coverage and of recovery after defoliation, ratooning ability, competitiveness, maintenance of stand, yield and tolerance of drought and plant pests. Based on the results, major forage grass alternatives to guineagrass for silage or green chop in the Virgin Islands were listed as elephantgrass, sugar cane and sudan sorghum. Major sod-forming grasses recommended for pasture included buffel grass, rhodes grass and pangolagrass in addition to guineagrass.

In 1971, selected clones of digitgrasses (*Digitaria* species) were evaluated specifically for drought tolerance.The clones were established by vegetative propagation during the wet season. Observations on survival and growth were made at intervals throughout the next 25-month duration of the trial. Significant differences in survival among species were found during the period of drought. Superior performance of clones within species were also demonstrated by two accessions i.e. USDA Plant Introduction (PI) #111110 (*Digitaria decumbens)* and USDA PI #2999795 (*Digitaria setivalva*).

Subsequently, the productive capacity of eight tropical grasses was assessed in large scale grazing trials on different soils and in different rainfall belts in 1973. Productive capacity was measured in livestock carrying capacity, animal daily gains and beef production.The overall performance of pangolagrass (the selected USDA PI #111110) was superior to those of Barbados sourgrass, buffelgrass, rhodes grass, coastal bermudagrass and guineagrass. Pangolagrass and elephantgrass, species of diverse growth habit, produced similar liveweight gains in these trials. In descending order of forage productive capacity, the soils were ranked as Granard clay loam, San Anton clay loam, Fredensborg clay and Cornhill clay loam.

These earlier concerted efforts at grass species selection, pioneered by Dr. O.J. Oakes and his able assistant Mr. Oliver Skov, yielded one lasting dividend for the livestock industry on St. Croix.The selected pangolagrass (USDA PI 111110) was established on large portions of twolocal sites (Mr Oscar Henry and Annaly farms) in the 1100+ mm rainfall belt of St Croix and has persisted under rotational grazing management for more than 25 years. Incidentally, these two farms usually encounter the least dry season feed shortage problems in the Virgin Islands. No such successful grass candidate has yet been found for the dry (less than 900 mm rainfall) eastern half of the island.

Grass-Legume Mixtures

Renewed public emphasis on low-input, sustainable agriculture that is environmental friendly, has caused a corresponding shift within the Agronomy program since 1986. Inter-cropping grasses with legumes which fix nitrogen is a promising means for providing N to the companion grass, improving the protein content of available forage and reducing non-point source of N pollution. Also, development of management systems that promote dry matter production, improve forage quality and maintain integrity of native pastures, by curtailing the ingress of malevolent plant species such as hurricane grass and casha into the native range, are crucial to sustainability.

Dr. Oakes selected leucaena in 1962 from among five woody legumes tested as a possible source of protein feed for the Virgin Islands. Although leucaena forage is high in crude protein (20 percent) and is still commonly cut from the road side and carried to livestock in the dry season, there is a strongly negative public outlook on that plant as a nuisance weed. Recently, alternative, less aggressive legumes to leucaena have been developed including selections of Desmanthus, Glycine and Teramnus. The effects of deferment date and clipping management on dry-season forage yield and quality of mixtures of these legumes and recently selected grasses were studied over 3 years. It was concluded that a late January deferment date for dwarf elephantgrass/glycine mixture has the greatest potential for forage bank on St. Croix. Mixtures of these selected legumes and grasses have been established across the rainfall gradients on the island and are being evaluated for their grazing tolerance. Meanwhile, the carrying capacity of a native guineagrass pasture under rotational grazing around the Kingshill area has been accurately determined from another 3-year Herbage Allowance study. Grazing rotationally with 535 pounds liveweight per acre of sheep (equivalent of 7 adult sheep or 1/2 cattle unit per acre) resulted in no deterioration to the guineagrass pasture and a yearly liveweight gain of 600 pounds per acre. From on-going trials, carrying capacity is expected to be much lower for continuous grazing system.

CONCLUSION

Continued expansion of the tourist industry and urban development in the Virgin Islands will translate into diminishing and more expensive land availability for livestock grazing. Cost effective methods of pasture improvement, in addition to sustainable forage and grazing management strategies, are essential for the survival of dairy, beef, sheep and goat production in the Virgin Islands into the 21st century. Our experiences within the past 25 years clearly demonstrate that the UVI-AES forage research team will strive to develop appropriate technology towards that survival. ×

Dr. Martin Adjei examines a grass/legume (elephantgrass/glycine) forage bank reserved for dry season feed supplementation.

Central High School ROTC performed for fairgoers at Agrifest 1995.

The Buffalo Soldiers entertained fairgoers at the 1990 "Agriculture Day."

Nutty Sorrel Bread

1	cup chopped sorrel
4	1/4 cups enriched flour
1	cup whole rye flour
1/2	cup sugar
2	pkg. yeast
2	tbsp. grated orange rind
1	egg, slightly beaten
1/2	cup warm milk
3/4	cup warm water
2	tbsp. margarine
2	tbsp. shortening
1	tsp. salt

Filling

4	tablespoons honey
1/2	cup chopped walnuts
1/2	cup currants
1/2	cup chopped sorrel

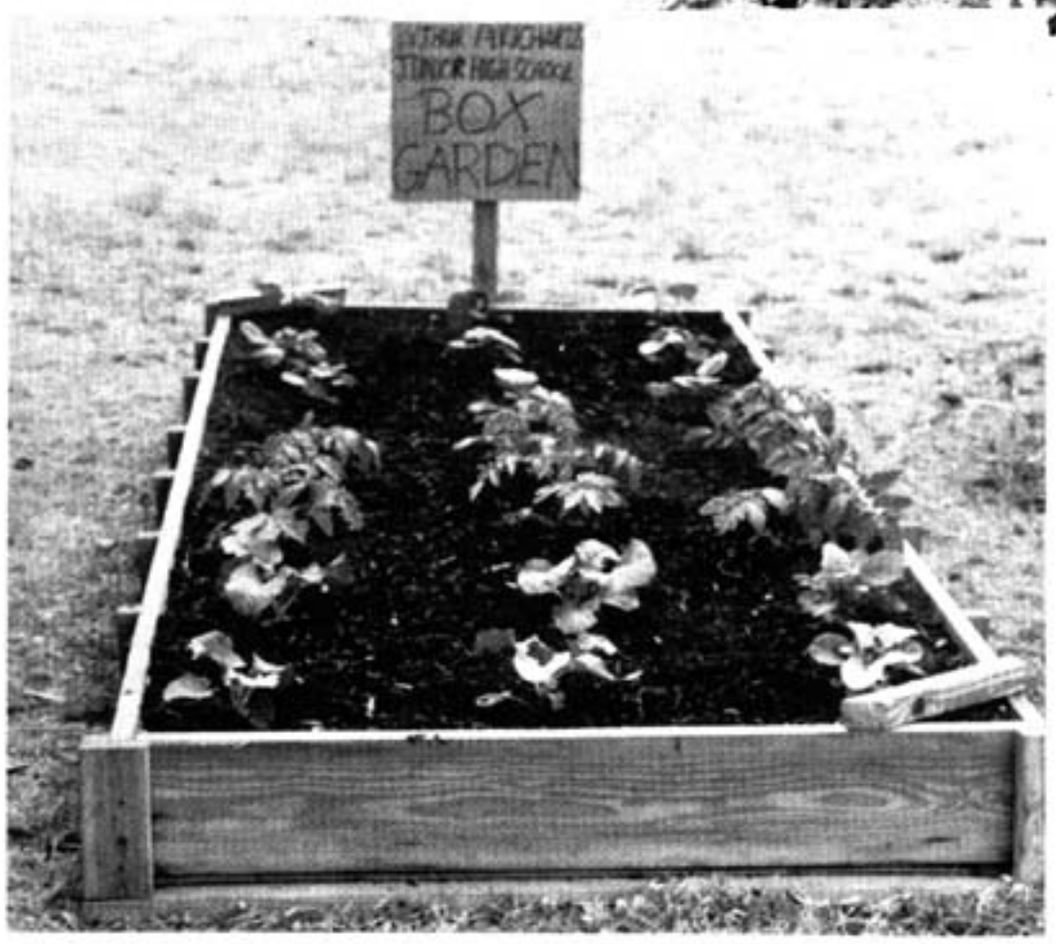
Cook chopped sorrel in 1/2 cup water until tender about 3 minutes. Combine enriched flour and rye flour on waxed paper. Place 2 cups of flour in mixing bowl; add yeast, salt, sugar, 2 tablespoons margarine, 2 tablespoons shortening, add warm water and milk. Beat for 3 minutes; cover; set aside to rise.

Add sorrel, grated orange rind and egg. Gradually add remaining flour to form a soft dough. Knead until smooth; cover and set aside to rise. Punch down 2 times; after third rising divide into two parts. Roll each portion out to a 6 x 7 rectangle. Fill with mixture made by cooking chopped sorrel with 1/2 cup water until water evaporates. Combine with chopped nuts, currants and honey.

To fill: Divide nut-currant sorrel mixture into 2 parts. Spread in center of triangle; roll ends of dough towards center to cover nut mixture. Pinch together; place in greased loaf pan with pinched side down. Bake in medium oven until done. Cool and brush top with mixture of 1 tablespoon honey, 1 tablespoon butter.

Reprinted from UVI-CES cookbook entitled BREADS.

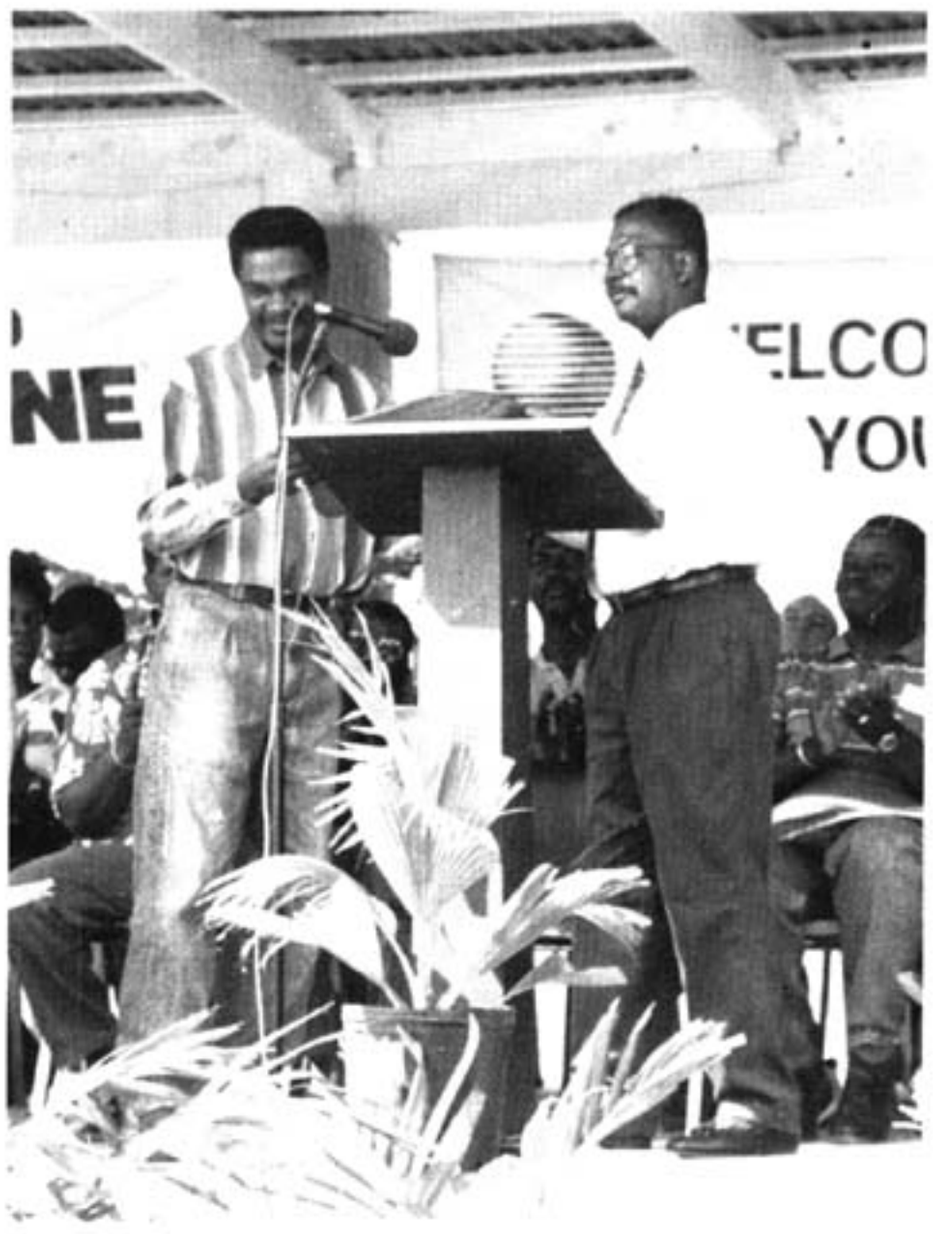
EXHIBITS FROM SCHOOLS AND YOUTH GROUPS



MEMORABLE MOMENTS

PARTING SHOTS


COMMISSION
ON
YOUTH


NE
YOU

Red Grout(Guava)

Extract juice from guavas. This may be done by:

1. Peeling skin from guavas and removing seeds. Use shells for preserves. Cover skins and seeds with water and boil. Drain liquid from cooked skin and seeds.

OR

2. Dice guavas. Cover with water and boil. Drain.

Mix 1/4 cup tapioca, 2 1/2 cups guava juice, dash of salt and 1/3 cup sugar (or sugar to taste). Bring to a boil over medium heat, stirring constantly until tapioca looks clear. Add a few drops of red food coloring to desired redness. Pour into serving dishes. Cool. Serve with topping of soft custard or ice cream.

Reprinted from UVI-CES Holiday Cooking.

Over the years, Mrs. Margaret Carter has been serving fairgoers a variety of local beverages.

Fish Pudding

3	pounds fish (blue fish preferred)
1	medium onion
1	sweet pepper
1	stalk celery
1/4	pound butter or margarine
1	small can tomato sauce
4	eggs, beaten
1/2	cup milk
12	saltines or salted crackers
	seasonings: crushed garlic, ground mace, ground clove, dash salt and pepper to taste

Bone and grind or chop the fish. Season with salt, pepper, garlic, mace and clove. Chop onion, sweet pepper and celery. Sautè in a pan with butter until tender but not brown.

Add tomato sauce. Remove from stove and add fish, crushed saltines or crackers, milk and beaten eggs. (The beauty of the pudding is in the stirring; it should be as light as possible). The pudding can be either baked or boiled.

To bake: Pour pudding into greased casserole dish. Sprinkle the top with cracker crumbs. Cover securely. Set in a pan half full of water and cook over a low flame for about 1 hour or until firm.

To boil: Pour pudding into a greased casserole dish, pudding or cake pan. Sprinkle the top with cracker crumbs. Cover securely. Set in a pan half full of water and cook over a low flame for about 1 hour or until firm. Makes 10 servings, 6 ounces each.

Reprinted from UVI-CES Native Recipes.

Members of the St. Croix Heritage Dancers performing at the Fair.

1980 Fair winners.


STRICTLY
NATIVE
TROPICAL &
SUBTROPICAL

Maubi

4	(3-inch) strips Maubi bark
5	quarts water
1	ounce sweet marjoram
1	ounce anise
1	ounce rosemary
1/8	teaspoon nutmeg, grated
1	(3-inch) cinnamon stick
1/8	teaspoon fresh orange peel, grated
3	pounds sugar
2	pinches granular yeast

To make "bitters," boil bark and herbs in one quart of water for 5 to 10 minutes. Cool. Fill another container with 4 quarts of water and sweeten with sugar. Add the bitters, then toss mixture with ladle. When it begins to foam add yeast. Strain through a clean cloth and bottle. Set aside overnight to age and ferment. Save some as a "starter" for the next making. If pineapple is available, you can add the rind of the pineapple when preparing bitters to get a pine maubi.

Reprinted from UVI-CES Native Recipes.

Saltfish Gundy

1	Pound salted codfish fillet
1	teaspoon capers
1/2	medium onion
1/2	cup salad oil
2	teaspoons vinegar
2	hard boiled eggs

Soak fish long enough to remove excess salt. Wash. Mix salad oil with vinegar and set aside. Put saltfish, onion, and capers through meat grinder. Combine well with salad oil mixture. Garnish with slices of hard boiled eggs.

For an interesting texture, flake saltfish into very small pieces instead of grinding, then reduce salad oil to 1/4 cup. Makes 10 servings, 2 ounces each.