

Lesley T. Lastufka
Lifewalk Christian School
Cedar Hill, Texas

Agricultural Education Offers Practical Hope for Suriname

Driving back from your summer vacation, you wonder when you'll see another tree. All you can see is fields of corn and soybeans for miles upon miles. Surely, you think, all that talk about the world "running out of food by 2050" couldn't be true. Unfortunately, it is true for many regions in the world. Independent since 1975, Suriname, a former Dutch colony, is located between Guyana and French Guyana in South America. It is mostly covered with tropical rain forests and has a fertile coastal plain bordering the Atlantic Ocean. The population of 481,000 consists mainly of Javanese, Hindustani, and tribal Maroons. The main economic activities include the mining of aluminum, gold, and bauxite; forestry; and fishing. Only 11% of the workers labor in agriculture, with farming taking place mainly in the coastal plain ("World Factbook"). About 70% of the people live below the poverty line, many of whom are rural farmers ("Suriname Population"). Not surprisingly, food security is a national concern.

The major crops grown in Suriname are rice and bananas. The vast majority of farmers rent their land from the government- in fact, only 21% of small-scale farmers own their land ("Proceedings" Table 4). A small rice farmer might farm 1 to 3 hectares (ha); in the hinterland, subsistence farmers work plots of 0.25 ha. A farmer makes approximately US \$873 to \$2618 annually. For a typical family of five, this equates to about \$1 a day. ("Woko Makadi" 1.1, 2.3) Most of this meager income is spent on food. Although their diets vary with their heritage, many families eat rice, cassava, vegetables, and some chicken or fish. This type of diet tends to be high in starch but low in protein, vitamins, and minerals. To increase food security among small farmers in Suriname, extensive agricultural education is needed. This should encompass planting diversified home gardens for better nutrition; and training in composting, crop rotation, no-till, and integrated pest management through Farmer Field Schools. These environmentally-friendly techniques will improve the farmer's soil and enhance crop productivity and quality. By implementing school programs and holding classes in nutrition and the healthful utilization of food, agricultural education can empower women and children.

After a recent six-year study, the United Nation Food and Agriculture Organization (FAO) concluded that sustainable and ecologically-friendly practices will increase the world's food supply, while helping the world's 900 million small farmers. An eight-year project in Malawi showed that these techniques can make significant contributions to a community's overall health and productivity. After giving the villagers legume seeds and technical advice in 2002, the farmers doubled their corn crop and halved their fertilizer use. The soybeans and pigeon peas took nitrogen from the atmosphere and converted it into a usable form. This, along with crop rotation, improved the soil fertility. These legumes also provided much protein for the diets of these Malawian villagers. More than 7,000 children made significant weight increases- this was a tremendous gain for a region that suffered from chronic malnutrition (Bourne 56).

What worked for Malawi can work for Suriname, too. Part of food security is food access and the ability of the people to afford the available food. Even if foods like rice, vegetables, meat, and fish are available at the local market, poor families may not be able to afford it! However, if a farming family produces and consumes only one or two types of crops without purchasing other foods at their market, malnutrition results. Whether a small farmer grows mainly rice or cassava, if he can grow more of what he needs nutritionally, he and his family would be more food secure. A diverse home garden can be planted with protein-rich soybeans, peanuts, yard-long beans, and lentils. Growing other fruits and vegetables would provide necessary vitamins and minerals. Undoubtedly, income can be generated by enterprising Surinamese farmers who sell their extra produce at the market. However tempting it may be

to plant cash crops like palm fruit, it must be noted that cash crops are subject to global price fluctuations; the farmer's best interests can be hurt. Maintaining a home garden with sustainable practices such as crop diversification and intercropping is the better path to food security! Planting several different kinds of plants in the same plot of land simultaneously for mutual benefits is known as intercropping. For example, corn fields can be interspersed with rows of beans; when insects harmful to the corn are blown onto the beans, they cannot survive, and their numbers diminish. Intercropping and crop diversification methods would indeed benefit small-scale farmers, but these farmers generally have limited knowledge of them. It is crucial for agricultural extension agents to educate small farmers in all these ideas and methods. Once a group of farmers grasps the importance of diversifying their crops and enriching their soils, they, in turn, can teach their friends and peers, spreading the knowledge.

Prior to 1995, rural districts were little developed and residents did not have the necessary information for development ("Rural Community" 1). In 2004, the Ministry of Agriculture of Suriname and the Inter American Institute of Cooperation in Agriculture (IICA) studied several villages in the rural north-eastern District of Marowijne. Situated in close proximity to abandoned areas once mined for bauxite, this district in the hinterland is partly swampy, partly forested, and partly barren. As part of the study, teams were sent to interview villagers, assess their needs, and hold workshops. Most, if not all, of the villagers were very poor and lacked schooling. Men often hunted or fished and cleared small food plots of 0.25 ha in size. Women were the main agricultural producers, growing the household staples of cassava, tayers, herbs, and vegetables. Although people were resourceful in selling their vegetables and handicrafts at markets, productivity remained low and poverty retained its tenacious grip. Most villagers needed training on how to increase and sustain agricultural production in their environment.

A major contributor to the problem was identified as the slash-and-burn technique used to clear cropland. When a food plot lost its fertility, cultivation would be shifted to a new plot by slashing and burning trees and brush. In rain forest areas, the trees deplete the forest floor of its nutrients, and when they are cut down, torrential rains wash the good soil away. Instead of eroding the land through slash-and-burn farming, villagers need to conserve it by learning methods like no-till farming and crop rotation. Well suited to areas where erosion is common, no-till farming consists of not tilling, burning, or plowing the stubble from last year's harvest (Kilman). Instead, new seeds are planted in small localized areas that have been sprayed with environmentally-friendly chemicals. The stubble acts like a mulch that holds moisture and eventually decompose into plant nutrients. Shifting cultivation can also be reduced through crop rotation. Crop rotation is a good technique for any kind of soil. Because repeatedly growing the same plant in the same plot will deplete the soil of certain nutrients, it is important for farmers to rotate the crop. The new plants use different nutrients from the soil and help "fix" the waste leftover from the previous plant into usable nutrients. The IICA researchers emphasized how crucial it is to build the capacity of Surinamese farmers through agricultural education and recommended that "extension activities could be organized through small scale training centers or *gangasa* in villages and be supplemented with a program of home gardening..." ("Woko Makadi").

One of the most effective ways, if not the most effective way, to educate farmers is through the Farmer Field School (FFS) approach. FFS are groups of farmers that meet regularly with extension agents or knowledgeable farmers. These trainers introduce the farmers to locally relevant techniques and materials. One method taught is called Integrated Pest Management (IPM). This uses knowledge of insect-resistant seeds and insect life cycles to minimize insect damage to plants, benefiting the farmers. These practices allow farmers to use less or no artificial pesticides, resulting in higher-quality harvests! In a field school in West Africa, teachers had great success with one IPM method in particular: removing leaves from a plant so that harmful insects would have less to damage. Instead of just instructing the farmers to cut off some of a rice plant's leaves, the FFS trainers and the farmers together grew experimental rice plots. "We have learned that we could cut about half the leaves of a rice plant off during its vegetative stage without losing a single grain at harvest because the plant compensates and grows

back... helps farmers to realize that they don't need to waste their money on insecticides," farmer-facilitator Sawadogo explained ("West African").

Surinamese farmers, too, have had good success with this participatory approach. In 2004, the FAO sponsored a FFS in both Guyana and Suriname, focused on aquaculture, which is the cultivation of fish, shellfish, and such. Practicing IPM, the farmers saw significant results. One hundred eighty farmers met with sixteen extension agents to raise red tilapia and armored catfish in their rice paddies. As the fish ate insects that usually plague rice plants, the fish grew and fertilized the rice in turn. As a result, artificial pesticide use decreased by 70%, while the rice production surged. Surinamese can benefit environmentally, nutritionally, and financially by attending FFSs to learn methods such as integrated pest management and aquaculture! ("Introduction")

In 2006, agricultural agents used FFSs to introduce the farmers to the techniques of hydroponics. Hydroponics involve crops that are not grown in soil, but in a liquid that provides the plants with all their necessary nutrients. Hydroponically grown plants in greenhouses can be grown year-round ("Hydroponics"). With training, Surinamese farmers can grow valuable crops, such as tomatoes, relatively risk-free. The Netherlands and Suriname have established the SuriTuin project in which the former would obtain a supplier of vegetables while the latter would benefit from export income. However, the Netherlands have noted in the past that Surinamese vegetables were unfit for consumption upon arrival because they were grown with too many harmful pesticides and were packaged improperly ("Project"). In 2007 the Ministry of Agriculture began a post harvest training program as a remedy. As part of the Regional Food Security Project, Suriname also set up five greenhouses to demonstrate vegetable productivity ("2007 Annual Report" 12). While educating farmers in techniques is absolutely vital to improving food security, farmers need access to small loans in order afford hydroponics materials and disease-resistant seeds.

Agricultural education isn't the only kind of knowledge that Surinamese farmers need. Women, who are usually responsible for preparing meals, need instruction in nutrition and healthy utilization of food. The Women-in-Development department also recommended a program to teach Surinamese to process foodstuffs safely and correctly for sale. Drying and home-preserving vegetables and fruits will enhance the year-round availability of food and stabilize seasonal price fluctuation. These agro-processing skills will provide jobs for women, 26% of whom are unemployed ("Proceedings" 3.12.3). Rural women are traditionally heavily involved in the production of food, from planting to harvesting to processing. Along with farming burdens, women are also responsible for the education and upbringing of their children. Learning basic nutrition and how to wisely utilize food will empower women and improve the food security of their families. Activities similar to those conducted by 4-H Club and Future Farmers of America should be implemented into elementary and middle schools. Raising small livestock and growing big melons and tomatoes will help children to learn proper farming techniques, stir up healthy competition, and give the children knowledge and skills to be proud of. These competitions should be televised via a government-sponsored television channel or program. Even though Surinamese farmers are very poor, a village usually has at least one television that is available. By watching these programs together, farmers can later discuss the ideas together and try them. These programs will also be an effective way for extension agents to reach more audiences and present new ideas.

It has been suggested that Surinamese farmers grow plants like oil palm trees for the manufacturing of biofuels. What would be the impact of this on Surinamese food security? Because oil palm is a highly valuable cash crop, farmers could indeed benefit from the money made by selling these plants to biofuel companies. However, as Malaysian farmers discovered in 2007, clearing the rain forest to make room for oil palm releases more carbon dioxide into the air than using biofuels will help reduce ("Once")! Perhaps the jatropha plant is a more promising candidate. This plant grows well in poor soil, and it can yield up to 100 gallons of oil per hectare to make biodiesel ("Alternative"). Unfortunately,

being a wild plant, jatropha crops are unpredictable and not quite ready for commercialization. In the future, oil palm and jatropha plants may help the Surinamese farmers to better food security, but as of the present, they should be taught that it is not in their best interest.

Before 1995, very little was done to encourage or establish agricultural education. In fact, in real dollar terms, funding for the Ministry fell 66%. ("IICA"). Crop production continuously fell between 1997 and 2004 ("Strengthening" 6-14). Happily, there has been greater awareness of the need for agricultural education since then. In 2004, a program focused on aquaculture in rice paddies was established using the FFS approach. This appears to be a sustainable method - participants decided to continue meeting with each other even after the end of the project. In the same year, a study conducted among subsistence farmers in the northeastern hinterland identified a great need for farmers to be taught sustainable agriculture techniques like crop rotation and diversification, and integrated pest management to increase crop productivity. In 2007, another FFS was organized to teach farmers hydroponics techniques. In 2007, the IICA held a workshop to revitalize and restructure the Surinamese Network of Rural Women Producers ("2007 Annual Report" 20). Although laudable progress has been made jointly by the Ministry of Agriculture and organizations like the FAO, IICA, and other non-government organizations, further progress is hampered by the poorly-staffed and under-funded agricultural extension services. In the District of Marowijne, only three of the seventeen staff members have completed secondary school; fourteen have only completed primary school. They are so under-funded that they have only a single motor boat for them to travel to villages. ("Woko Makadi" 3.6). The Suriname government will have to correct their extension programs before effective agricultural education can occur. As Director General of the IICA, Dr. Chelston Brathwaite said, "We see the need for research, extension and teaching. This powerful combination is critical to developing the agriculture sector. And without agriculture we cannot overcome poverty."

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