A Kitchen Garden Promotes Food Security at The Bellairs Research Institute

By Lara Steinhouse

The Problem: Food security, when all members of a population have access to a reliable food supply made up of nutritious and safe food for a healthy lifestyle at an affordable price, is threatened in Barbados (FAO, 2002). Access to affordable fresh food is limited, as in many other Caribbean countries, due to high dependency on food importation. The geographic and demographic constraints of small, vulnerable Caribbean economies, coupled with shifts in the global trade environment in recent decades, have contributed to this dependency. There is an irrevocable link between the state of agriculture within a nation and its nutritional and health status (Deep Ford & Khaira, 2007a). The current state of food production in Barbados is dire; approx. 80% of all food is imported, including 78.9% of fruits, 78.4% of milk, 28.5% of vegetables, and over 100% of its cereal demand, since Barbados imports a surplus of cereals to process and export to other Caribbean countries (Deep Ford & Rawlins, 2007). This high reliance on imported food makes the country's food supply vulnerable to fluctuations in global food and fuel prices, and currency exchange rates. Although local vegetable production is able to meet a little over 70% of current national needs, this percentage appears to be decreasing (FAO, 2007a; Seguin, 2011). This is due to both limited land availability for large-scale farm production, and a decline in household produce production, part of a global trend. The percentage of households involved in home vegetable production has declined from 74% in 1969 to a mere 32.2% in 2000 (FAO, 2007a).

In order to address food security issues in Barbados, drastic changes in agricultural policy are required. However, efforts can also be made at the individual and household levels to promote food security. The planting of a backyard garden is one measure to ensure access to a nutritious and reliable source of vegetables and fruit throughout the year and as a means of increasing people's consumption of these healthy foods rich in vitamins and minerals and other health-promoting compounds known as phytochemicals. Fruit and vegetables provide only 4.4% of dietary energy supply of the typical Barbadian diet. Barbadians generally receive most of their calories from cereals (29.7%), sweeteners (18.9%) and meats (12.6%) (CFNI, 2003).

Vision, Goals and Objectives: Bellairs Research Institute (Bellairs) is a McGill campus located in the city of Holetown, parish of St. James, in Barbados. Bellairs hosts student groups throughout the year for various research projects, academic workshops, and field studies. The vision of this 9-week internship was to establish a garden to serve as a model for teaching home gardening to visiting students and in the long-term, to the larger Barbadian community. The first goal was to create a small kitchen garden for vegetables and a herb garden. The specific objectives of this internship involved: (1) building a garden based on sustainable agricultural practices, (2) working with the Bellairs staff to ensure the integration of garden maintenance and produce use into the institution's daily operations and menus, (3) improving the sustainability of Bellairs' food system by encouraging both gardening and "buying local" and (4) introducing "garden-friendly" recipes for the meal plan, and (5) developing and strengthening partnerships with local organizations for the eventual creation of a community learning garden on the Bellairs Campus.

The Garden

Benefits of kitchen gardens include: increasing the availability of fresh vegetables and herbs and reducing the overall food bill of the institution by decreasing money spent on over-priced vegetables at the supermarket. In addition, a kitchen garden could offer the possibility of income generation in the long-term, if surpluses can be sold to a local market. Additional benefits of a kitchen garden are to enhance the esthetic value of the campus and build a sense of community by creating an environment to encourage shared knowledge and skills associated with home food production (GAP, 2009; Brazier, 2011).

Sustainable Agricultural Practices: Sustainable agriculture is defined as a production system that limits the need for non-renewable inputs, such as synthetic fertilizers and pesticides, by optimizing the use of on-farm resources, including animal manure for fertilizer (Seguin, 2011). A sustainable farming model, with animal production, is a long-

term goal for Bellairs campus. Ideally, the campus will become self-sufficient in its fresh produce needs.

Installation of a water-harvesting tank was an essential component for the long-term success and sustainability of the kitchen garden. Water collection is essential during the rainy season to extend water availability into the dry season. A 200-gallon tank was installed to collect rainwater from the roof of the recycling shed [Fig. l]. Its location was selected based on proximity to the garden beds to facilitate irrigation. Once the plumbing is finalized in the coming weeks, the water tank will feed both the hose and a drip line that will be set up along the wall above the raised bed. Careful water application will be necessary during the dry season to maximize water conservation.

Fig. 1: The water harvesting tank is located behind the herb garden, adjacent to the recycling shed. A gutter from the shed will feed the tank

Another sustainable practice involved installation of a compost system designed to take wet waste from the kitchens and convert this into organic fertilizer for incorporation into the garden beds before each planting cycle. Compost adds organic matter that improves both water and nutrient retention in the soil. In order for waste to decompose effectively, the pile must contain adequate carbon and nitrogen to feed compost microbes. The optimal ratio of carbon to nitrogen (C:N) for the activity of microorganisms is 30:1, with higher ratios being adequate for slower composts. This ratio can be attained by alternatively layering high carbon and high nitrogen materials. Typically two parts grass clippings or food waste (C:N ratios of 15 and 20:1, respectively) are covered with one part fallen leaves (60:1). Animal manure can also be added to the compost pile as a source of nitrogen (CWMI, 2005). Chickens were temporarily kept on campus over the summer and so their manure was added to the pile during this internship. Bellairs' administration should consider housing layer hens over the long-term to provide a constant source of nitrogen to the compost, in addition to providing fresh eggs for the kitchen. As mentioned, animal production is a fundamental component of a sustainable agriculture model.

Another component of sustainability used in the garden was intercropping, which is the technique of planting several crops into a single garden bed. In the garden, spinach (*Spinacia oleracea)*, chives *(Allium schoenoprasum)* and Chinese cabbage *(Brassica rapa, Cinnensis)* were planted together [Fig. 2]. Benefits of this practice include optimizing the productivity of the space, reducing the spread of diseases and pests, and benefiting from differential nutrient use from different vegetable crops (Brazier, 2011).

Fig.2. This is an illustration of intercropping: A Chinese cabbage plant was surrounded by 4 spinach plants and 2 chive plants. In order for this practice to be worthwhile, multiple rows of each species would be planted as the garden expands.

Cover cropping is the practice of growing a crop for the purpose of soil protection, and is another sustainable technique. Cover crops can protect the soil from weeds, break pest cycles, fix nitrogen when leguminous crops are used, provide crop variety, and enhance the organic content of the soil (Seguin, 2011). At Bellairs, pigeon peas (*Cajanus cajan* L.) were planted in one section of the raised bed to provide a vegetable-based source of protein for some of the chef's recipes, including curries and vegetarian stews, and to improve the nitrogen content of the soil, reduce soil erosion, and retain soil moisture [Fig. 3].

Fig. 3 Pigeon peas in one section of the raised beds: 3 days (left) and 2 weeks (right) after planting

The last component created for the garden was an enclosed plant nursery. Its use is to germinate seeds and acclimatize seedlings prior to transfer to the garden. This structure could help reduce garden expenses by making the garden self-

sufficient for transplants and eliminating the need to purchase most crop seedlings for the garden [Fig. 4]. However, the enclosed environment is currently too shady for plant growth. To improve the function of the nursery, a more transparent material should be used as shade netting and branches from surrounding trees that extend above the nursery should be pruned or removed. If these measures do not result in adequate sunlight for plant viability, the entire structure should be relocated in front of the vegetable bed, which is exposed to plenty of sunlight throughout the day.

Fig. 4. Painting in the plant nursery. Left: Inside view of the nursery. The wooden frame shown is used as a table for seedlings trays. Right: View from outside the structure.

Location: Throughout the internship, four garden beds were prepared [See map: Fig. 6 a; note A,B,C].

1. Vegetable crops were planted along the South wall because of optimal growing conditions, adequate sunlight throughout the day, and proximity to the water tap. Plants grown here were: spinach, chives, lettuce (*Lactuca sativa* L.*),* pigeon peas, cassava (*Manihot esculenta* Crantz), Chinese cabbage, lemon grass (*Cymbopogon* spreng.), and cucumbers (*Cucumis sativus* L.) [Fig. 6a].

2.A herb bed was prepared adjacent to the vegetable bed. This was used to plant basil (*Ocimum basilicum* L.), thyme (*Thymus vulgaris*), lavender (*Lavandula spica* L.), oregano (*Origanum vulgare* L.), bay leaf (*Laurus nobilis*) and marigolds (*Tagetes spp.)* [Fig.6 b].

Crops: When planning any garden, crop selection is very important. Variety is essential to ensure that a diverse array of fruits and vegetables are ready for harvest throughout the year. For this reason, planting perennial fruit plants, such papaya(*Carica papaya* L.) and guava (*Psidium* L.) as well as annuals such as lettuce and cucumbers, improves food security (Brazier, 2011). The planting of fruit should be considered at Bellairs, as trees would help beautify certain neglected parts of the property, such as the back area near the garden. Moreover, fruits could be offered as nutritious dessert options on the menu plan, replacing highly processed and high in simple sugar desserts, such as cakes and ice cream, which are currently being offered to students on a daily basis.

According to the Food and Agricultural Organization's recommendations (Brazier, 2011) for backyard gardening to promote food security, carbohydrate containing crops, such as cassava, were mixed with protein-containing crops, such as pigeon pea, in addition to a variety of other vegetables and fruit crops. Future McGill internship students could include fat-containing fruit crops, such as avocado (*Pearse Americana* Mill.. Increased crop availability will ensure that the Bellairs kitchen will benefit from a variety of dietary resources throughout the year.

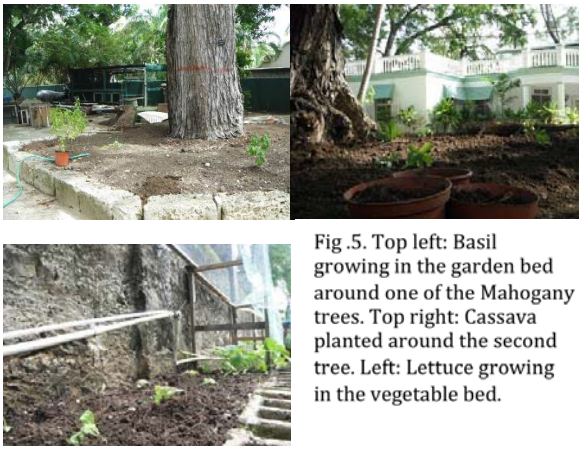

Fig .5. Top left: Basil growing in the garden bed around one of the Mahogany trees. Top right: Cassava planted around the second tree. Left: Lettuce growing in the vegetable bed.

Making the fundamental link: To ensure a successful garden at Bellairs, it was essential to establish a link between the garden and the kitchen right from the beginning. To do so, the head chef, Sharone, was included in planting decision-making and was given information about harvest dates and expected yields so that she could plan her menu and food purchases accordingly. Recipes that include one or more crops that were planted in the garden were presented to the chef, particularly salad items, and several spinach recipes, since spinach was particularly vigorous in the garden.

Since "buying local" is a basic tenet of sustainability, locally-grown vegetables were highlighted in suggested recipes and the chef has begun to make weekly orders of fresh vegetables from the local organic farmer's association as a means of supplementing garden produce and

further decreasing dependency on imported vegetables.

One recipe, a Caribbean curry with pigeon peas and plantains, was tested in the Bellairs kitchen and has since been added to the summer menu. Pigeon peas from the garden will be used when they are harvested and plantains and other vegetables will be purchased from the organic farmers. Further work should be done to conduct a nutritional analysis and costing assessment of recipes on the current menu. These figures can later serve as a benchmark to evaluate the impact that the garden and organic purchases have on the nutritional content and food costs of meals offered at Bellairs.

Teaching garden for community learning: The long-term vision for this gardening project is to expand the kitchen garden into a model garden for community learning. As a teaching institution, Bellairs can provide opportunities for resident students and community groups to learn how to decrease dependency on food imports. The property could, in time, serve as a "best practices" model for community groups who want to learn the skills required for home gardening. With this in mind, efforts were made during this internship to strengthen partnerships with local organizations, such as the Inter-American Institute for Cooperation in Agriculture (IICA) and the Soil Conservation Unit of the Ministry of Agriculture, as well as with local organic farmers. The kitchen garden is not only a means for Bellairs to become more self-sufficient in its fresh produce needs, but as one component of a sustainable food system for the greater community.

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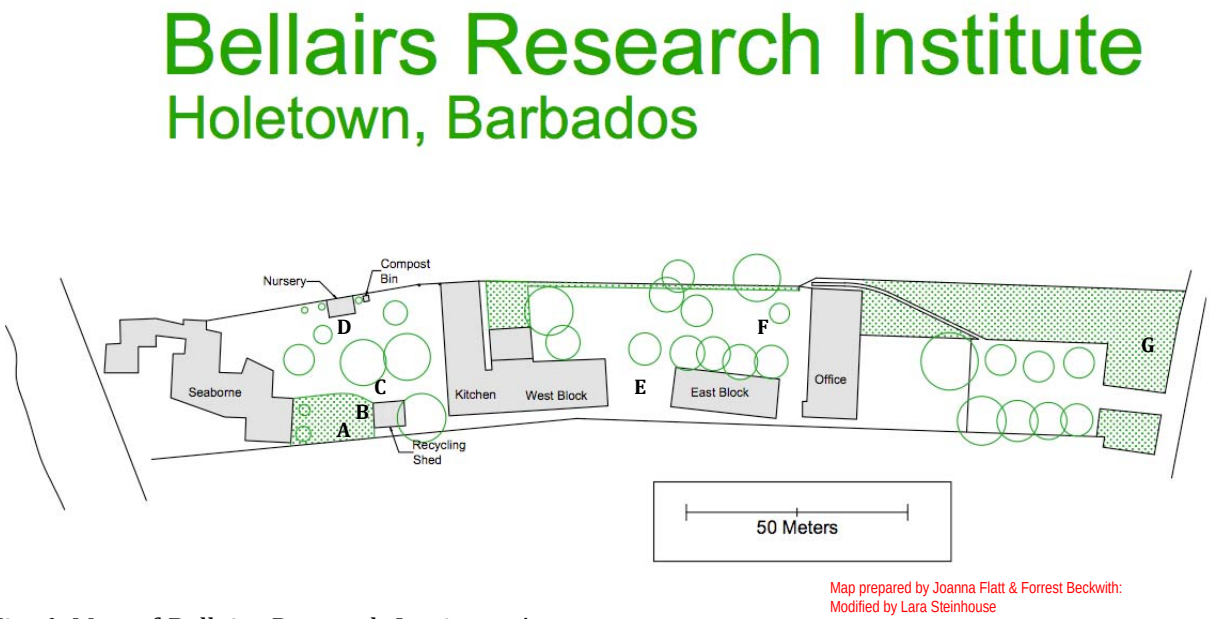

Fig. 6. Map of Bellairs Research Institute. A: Garden bed along South Wall. B: Herb garden. C: garden beds around Mahogany trees. D: Plant nursery. E: possible planting site between East and West blocks. F: Possible planting site behind Brace building. G: Possible planting site in front of property.