



Figure 5 RADA Director and Technician inspecting irrigation system, Chester Castle, Hanover

The Highgate unit is already producing crops of tomato and sweet peppers (Fig. 6), while seedlings are being grown to be planted at Chester Castle.

RADA is partnering with Lennon High School in Mocho, Clarendon by providing 50% construction costs, for a greenhouse along with technical advice and irrigation system installation. This will assist in training students and farmers from that surrounding area.



Figure 6 Peppers being grown at Paul Henry's greenhouse

Some farmers who have attended RADA training days (Fig. 7) in Greenhouse technology have constructed units on their own and started production. Others are gathering further information through the RADA system and from more experienced growers, in an effort to begin production.

RADA has also assisted with irrigation, marketing information, construction and training with three other green houses in Douglas Castle and Clarendon in St. Ann. Training is also been conducted with the Greenhouse Growers Association.



Figure 7. DFCPMP Farmer & staff training

The Authority is facilitating increased understanding of the technology through field monitoring, providing climate recorders, literature research and ongoing discussions. It is also strengthening field officer capabilities and preparing technical documentation on the subject.

**Challenges:** Notwithstanding these huge benefits, several challenges exist. Ecological, physical and socio-economic conditions in Jamaica call for modifications to this introduced technology being used currently. For example, the constant water supply required for greenhouse horticulture to



Figure 8. Greenhouse water catchment in upland Jamaica

achieve its potential, is limited at Jamaica's higher elevations (Fig. 8). At the same time, lower elevations where water is readily available, have high temperatures. This poses challenges for more appropriate design and construction to reduce heat buildup.

The medium in which plants are grown can be very important for maximum productivity. Soils may contain root pathogens which will significantly reduce yields. Other materials used in green houses to avoid this risk require stricter crop nutrition management, with which most local farmers are unfamiliar. Training, research and validation work are therefore needed.

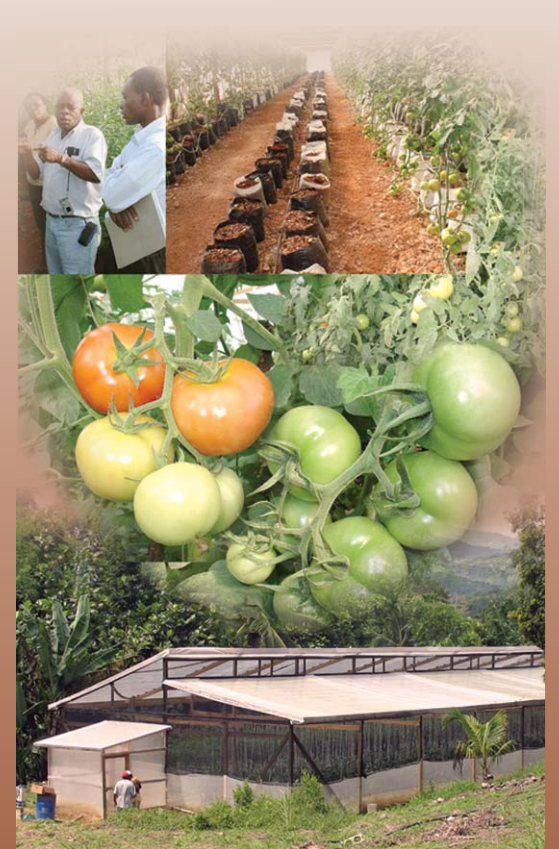
Start-up costs are currently high compared to conventional production, mainly due to the construction component. Six hundred square metre (0.15 Ac) units now cost over J\$1.0 M to construct. This restricts potential benefits to the overall rural economy, as most small operators have limited access to financing. Work on lower cost design and construction materials is therefore being pursued.

### Conclusion

Greenhouse technology offers significant potential for vegetable horticulture and consequently, rural development in Jamaica. RADA is committed to a strategically planned programme for development of the industry in the context of a collaborative approach among stakeholders. To this end the Authority has assigned high priority to these efforts, in support of the current thrust by the Ministry of Agriculture & Lands sector development thrust.

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EMBRACING  
**GREENHOUSE**  
TECHNOLOGY



**RADA**  
RURAL AGRICULTURAL  
DEVELOPMENT AUTHORITY

## Introduction

Greenhouses are buildings specially designed for growing plants. They are widely used in temperate countries, particularly for growing plants during the colder months. In warmer countries they are mostly used at higher elevations, to avoid heat buildup which can reduce plant performance. Under greenhouse production, yields can be significantly increased, compared to open field conditions if the practices are carried out correctly.

## Benefits of Greenhouse Technology

Greenhouse technology is being prioritized by RADA due to the numerous associated benefits listed below.

**Yield and Volume:** Greenhouse production when carried out correctly, can significantly increase yields over what is possible under open field production. For example, greenhouse tomato yields four to five times more. Furthermore, harvests last up to 8 months compared to one month in the open (Table 1). These high yields allow farmers to market consistent volumes of produce weekly. This ensures and maintains buyer loyalty and market share.

Item	Open Field	Green house
No. plants	800	1,500
Harvest period (weeks)	4	24
Marketable Yield (kg)	1,280	15,000
Avg. price (\$/ kg)	44	88
Income (J\$)	56,320	1,300,000

Table 1 System comparison - 600m<sup>2</sup> (1.5 sq ch) Tomato plot



Figure 1 High yielding greenhouse tomato

**Quality:** Crops from green houses are protected from pests, diseases and other hazards that affect open field crops. The need for pesticides is also reduced, which lowers costs and risk of harmful residues on the crop. As a result of this, higher quality produce is possible (Fig. 1). For consistent quality, good agricultural practices such as optimal plant population, irrigation, plant nutrition and vigilant crop protection (must still be maintained).

**Pest and Disease Management:** Crops grown in the open field are exposed to all insects and diseases in the open environment. Greenhouses are covered with mesh screen to keep most of these pests and diseases they carry, away from the crop. However, strict monitoring for breaks in the mesh and proper use of entrance doors, is necessary. The plastic roofing materials also reduce the level of some diseases, by controlling the type of light entering the house.

**Weather:** Weather effects in the open field are reduced significantly by green houses. Plastic roofing keeps rain off the crop, thereby limiting the growth of many fungi and bacteria.

Although some wind movement is necessary for pollination and removing excess humidity from the plant canopy, strong winds can harm plants. Greenhouses protect the crop from such winds, excepting storms or hurricanes.

The working environment inside greenhouses is much more hygienic than outdoors. This enhances productivity as well as worker comfort (Fig. 2), outside of producing excess heat



Figure 2. Comfortable work environment

**Growing Medium:** Greenhouse production can be carried out on marginal lands as plants can be grown in containers (pots, bags) with or without soil. Some materials used include coir, rock wool, vermiculite (Fig. 3). Hydroponics is also practiced in greenhouses.



Figure 3. Coir and glass wool growing materials

**Land space:** Small scale growers can benefit tremendously from this technology as it does not require large land areas to generate a profit.

## RADA Initiatives

RADA through the Domestic Food Crop Production and Marketing Project (DFCPMP), has embarked on a Green House Production Programme with farmers. It seeks to generate interest in the technology by exposing a wider cross section of farmers, especially the youth, through hands-on training and partnerships with interested groups and individuals.

To date RADA has constructed two green houses in collaboration with two farmers' groups, in Highgate, St. Mary (Fig. 4) and Chester Castle, Hanover (Fig 5). Units are 600 m<sup>2</sup> (0.15 Ac) in size and covered with clear plastic and mesh.



Figure 4. RADA-constructed greenhouse, Highgate St. Mary