Protected Agriculture and Open Field Crop Diversification to Enhance Food Crop Productivity in CARICOM

CIFSRF CARICOM FOOD SECURITY PROJECT
IMPROVING NUTRITION AND HEALTH OF CARICOM POPULATIONS
“LINKING THE CARIBBEAN FOR REGIONAL FOOD AND NUTRITION SECURITY AND RURAL DEVELOPMENT
OCTOBER 10TH AND 11TH 2013
GUYANA

“A HEALTHIER, FOOD SECURE CARIBBEAN”
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Outline

- **Background**
  Overview of Potential of Protected Agriculture (PA) to improve the availability and accessibility of selected crops.

- **Major research activities**

- **Highlights and outcomes of research and development activities**

- **Conclusions: critical aspects ensuring food security in the region**
Protected Agriculture vs Open Field Production

PA technologies vary from plastic greenhouses, shade houses, plastic tunnels, plastic mulches and straw mulches. These systems address the limitations of open-field cultivation of vegetables “modification of the natural environment to achieve controlled or improved plant growth” (Jensen and Malter 1995)
Benefits of Protected Agriculture

- High production per unit area of land
- Extended harvests
- Easy control of pests and diseases
- Efficient water utilization
- Low cost of labour (spraying, weeding, watering)
- High quality of crop produce
- Less exposure to chemical toxins
- Attractive to youths
Challenges of PA

- High initial cost of investment
- High level of greenhouse management skill required
- Inappropriate structures
- Unsuitable growing conditions
  - Sub-optimal and/or inconsistent yields
  - High temperatures and RH
  - High levels of pests
- Inadequate technical support
- Inadequate and inappropriate management practices
- Poor record keeping
- Limited flow of information key among stakeholders
- Heavy reliance on imported inputs – variable availability (varieties and growth media)
Protected structures

- Tunnel type greenhouse
- Gable roof type greenhouse
- Adaptive type greenhouse
- Semi-protected shadehouse
Component I: Protected Agriculture

- Identification of suitable heat tolerant tomato and sweet pepper varieties and local growing media for use in PA structures
  - Assess yield and yield components of varieties
  - Pest and disease incidence
  - Environmental conditions
  - Monitor and assess physicochemical properties of the drainage water
  - Monitor and assess crop nutrient status using destructive and non-destructive techniques
  - Assess postharvest fruit quality and shelf life

- To improve production knowledge and skills of protected agriculture producers
  - Training stakeholders and growers on “best practices” in PA production
  - Demonstrating technologies and practices for improving production, post harvest handling.
Component II: Field Crop Diversification

- To assess the varieties acceptable for local fresh and processing markets and/or export
- To evaluate the profitability of production systems
- To engage farmers as collaborators in production of new pumpkin varieties for export
- Needs assessment workshop with stakeholders to articulate SWOT for each group.
- Consumer preference test
Total yield of tomato varieties in two media types

<table>
<thead>
<tr>
<th>Variety</th>
<th>Sharp Sand</th>
<th>Coconut Coir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribe Hybrid</td>
<td>2970.6</td>
<td>3465.51</td>
</tr>
<tr>
<td>IT 71</td>
<td>3110.4</td>
<td>3463.2</td>
</tr>
<tr>
<td>Rhapsody</td>
<td>1618.8</td>
<td>5523.9</td>
</tr>
<tr>
<td>Striker</td>
<td>2370.1</td>
<td>2890.7</td>
</tr>
<tr>
<td>Summer Star</td>
<td>3068.2</td>
<td>3431.2</td>
</tr>
<tr>
<td>Versatile</td>
<td>2022.2</td>
<td>3782.1</td>
</tr>
</tbody>
</table>

Total Fruit Count/Weight (g)

- **Caribe**
- **Hybrid 61**
- **IT 71**
- **Rhapsody**
- **Striker**
- **Summer Star**
- **Versatile**
### Marketable Yield of Sweet Pepper in Sharp Sand (SS) and Coconut Coir (CC)

<table>
<thead>
<tr>
<th>Sweet Peppers in Coconut Coir</th>
<th>Sweet Peppers in Sharp Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admiral – 3.98kg</td>
<td>Admiral- 1.34kg</td>
</tr>
<tr>
<td>Canape – 3.53kg</td>
<td>Canape – 4.27kg</td>
</tr>
<tr>
<td>Geneva – 3.59kg</td>
<td>Geneva – 1.27kg</td>
</tr>
<tr>
<td>Bullnose -2.46kg</td>
<td>Bullnose – 2.59kg</td>
</tr>
<tr>
<td>Aristotle – 2.34kg</td>
<td>Aristotle- 0.98kg</td>
</tr>
</tbody>
</table>
Yield in selected growth media

Sweet pepper

Tomatoes

Media containing compost showed greater yields
Pumpkin postharvest studies

Pre-cured pumpkin fresh weight and cavity volume

Pre-cured pumpkin fruit dimensions
Working with farmers and teaching

- Working with farmers using the Farmer Participatory Approach

- Student research and teaching
Capacity building for PA in Trinidad

- Basics on compost production
- Greenhouse basics: A farmers' perspective
- Stakeholder training in partnership with CARDI
Three best cultivars of carrots are Juliana in terms of weight and Abaco and Kuroda in terms of nutritional content, and considering there were no significant difference between Juliana and Abaco with respect to fresh or dry weight; Abaco can be considered the best variety of carrot in the first trial.
Capacity building in St. Lucia

- Training and research activities at Sir Arthur Community College (SALCC), St. Lucia
Conclusions: critical aspects ensuring food security in the region

- Protected agriculture is a viable technology to improve food and nutrition security
- Suitable hybrid varieties identified but not regularly available
- Substrates influence the chemical composition and behavior of the root zone resulting in greater nutrient and water retention; their use should be encouraged under prescribed fertigation.
- Curing pumpkins induced skin hardening and healing of superficial wounds thereby effectively reducing secondary infections
- Further investigations are being conducted to:
  i. Determine shelf life extension of pumpkins after curing.
  ii. Sensory evaluations of cured fresh-cut pumpkins using modified atmosphere packaging.
THANK YOU!

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