Identification of Knowledge and Technology gaps in high tunnel (‘greenhouse’) tomato production in Kirinyaga and Embu Counties

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Introduction

- Agriculture is one of the key sectors to deliver 10% annual economic growth (Vision 2030)

- Utilization of new knowledge and productivity enhancing innovations is key for transforming small holder agriculture from subsistence to commercial enterprises

- The horticulture sub-sector in Kenya plays a major role in meeting domestic needs for food, generation of income, foreign exchange earnings and creation of employment

- Vegetables are a key component of the horticultural sub-sector and contribute an important part of local diets
Introduction...

• Tomato is grown in almost all counties between 1150 and 1800 m above sea level

• In the past decade, tomato has gained importance as an income generating crop in high potential and peri-urban areas

• The crop was ranked first in a prioritization of vegetable crop value chains in Kenya (KARI 2011)

• In 2011, area under production was 19,000 ha, from which 600,000 MT valued at KES 14.2 billion were produced (HCDA,2011)
Introduction...

- Production was mainly under open field conditions until the adoption of modified high tunnels popularly known as ‘greenhouses’ in the last five years.

- This innovation has to a large extent been driven by the private sector with Amiran Company Limited leading in the design, manufacturing and sales of the high tunnels.

- The rapid growth in adoption and uptake has spawned numerous local enterprises that are fabricating and vending tailor made tunnels for vegetable production.
• The production system economizes on space advantageous in the context of decreasing arable farm sizes

• The innovation has potential to attract more highly trained youth to horticultural farming since it is perceived to be smart, modern and cutting edge technology

• Less labor is needed hence senior citizens can be gainfully active in farming after retirement from formal employment especially in peri-urban settlements
Introduction....

- There has been a rapid growth in adoption and uptake of the innovation resulting in

- Local enterprises that are fabricating and vending tailor made tunnels for horticultural purposes

- Aggressive marketing, linkages with microfinance institutions, & partnering with relevant government ministries and NGOs has contributed to enhanced uptake and adoption of the technology.
Statement of the problem

• Despite the high adoption of the technology, sustainability is faced by many challenges including lack of technical back up on the innovation

• While early adopters are abandoning the technology

• Others are investing in it
Statement of the Problem……..

Sustainability of profitable utilization of the high tunnel tomato production innovation is threatened by bacterial wilt caused by *Ralstonia solanacearum*
Justification of the study

- Increased demand for tomato as a nutritious vegetable
- Need for diversification of enterprises for the urban and peri-urban agriculture
- Need for engagement of youth in agriculture for wealth and employment creation
- Farmers have already invested in the technology and need technical back up for sustainability
Objective

To identify knowledge and technology gaps in the high tunnel tomato production systems in Embu and Kirinyaga Counties of Kenya.
Materials and Methods

• A survey was conducted in Embu and Kirinyaga Counties in May 2012

• Multidisciplinary team (KARI, KU, MoA and KENFAP)

• Structured questionnaire to capture data on tomato production practices

• Face to face interview with farmers & observations in the high tunnels
Materials and Methods….

• Purposeful sampling of farmers with high tunnels

• Location of the sampled high tunnel was marked by use of a GPS

• Descriptive statistics was done using the Microsoft excel 2007 tools
Results and Discussion

1. Social economic characteristics
   - 64.3 % male, 35.7% female
   - Aged 25-74 yrs
   - Education
     - 48 % secondary,
     - 35.7 % tertiary,
     - 32.2 % Primary or no formal education
Results and discussion...

Major disease constraint

• Bacterial wilt (*Ralstonia solanacearum*)
  • Reported by 64.3% of the respondents

• Lack of knowledge on soil sterilization (solarlization) to reduce inoculum)

• Absence of double door or footbath for disinfection of workers’ shoes
## Results and Discussion.....

### 2. Source of information

<table>
<thead>
<tr>
<th>No</th>
<th>Source</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vendors</td>
<td>40.2</td>
</tr>
<tr>
<td>2</td>
<td>Ministry of Agriculture</td>
<td>20.8</td>
</tr>
<tr>
<td>3</td>
<td>Electronic media (Radio +TV)</td>
<td>11.0</td>
</tr>
<tr>
<td>4</td>
<td>Internet</td>
<td>10.2</td>
</tr>
<tr>
<td>5</td>
<td>KARI</td>
<td>9.8</td>
</tr>
<tr>
<td>6</td>
<td>Friends</td>
<td>8</td>
</tr>
</tbody>
</table>
Results and Discussion....

Major insect pest
- Whiteflies-reported by 60.7 % of the respondents

- Insect proof netting and double exclusion doors can prevent entrance into the high tunnel
Pesticide use!!!!!
<table>
<thead>
<tr>
<th>Constraint</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacterial wilt</strong></td>
<td>17</td>
<td>82.2</td>
</tr>
<tr>
<td>Lack of knowledge on high tunnel production and management</td>
<td>5</td>
<td>17.9</td>
</tr>
<tr>
<td><strong>Poor greenhouse construction</strong></td>
<td>5</td>
<td>17.9</td>
</tr>
<tr>
<td>Lack of water</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td>Whiteflies</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Not profitable hence has deserted the greenhouses</strong></td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td>Poor tomato variety</td>
<td>2</td>
<td>7.2</td>
</tr>
<tr>
<td>Theft</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Lack of market</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>High cost of inputs</td>
<td>1</td>
<td>3.6</td>
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</tbody>
</table>
Recommendations

• Monitoring of high tunnel tomato production should be done in different agro-ecological zones

• Model high tunnels should be selected for training of farmers in the Farmer Field School (FFS) approach

• Intensive training on high tunnel tomato production is crucial

• Research into use of plant resistance (Tomato grafting) for a sustainable solution to bacterial wilt disease should be initiated
ACKNOWLEDGEMENT

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- Farmers for cooperation
Thank you for your attention!!