Recent Challenges and Developments for Solanaceous Crops in Thailand

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Asian Solanaceous Round Table, 2017
Day 1, Session 2
Thursday 23rd February
Solanaceous Crops in Thailand

• Focus on Pepper, Tomato and Eggplant

• Presentation overview for each crop will include:
  • Recent market status
  • Current success in crop development
  • Future challenges for crop development
# Pepper Market Overview in Thailand

<table>
<thead>
<tr>
<th>Type</th>
<th>Area (Hec.)</th>
<th>Seed (kg.)</th>
<th>Main area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upright Big fruit</td>
<td>28,949.28</td>
<td>7,239.72</td>
<td>Chaiyaphum, Nakornratchasima, Srisaket, Ubonratchathani</td>
</tr>
<tr>
<td>Upright small fruit</td>
<td>20,862.24</td>
<td>5,215.56</td>
<td>Tak</td>
</tr>
<tr>
<td>Big fruit</td>
<td>4,958.24</td>
<td>1,239.56</td>
<td>Prae Chiang Mai</td>
</tr>
<tr>
<td>Sweet pepper</td>
<td>57.92</td>
<td>14.48</td>
<td>Lamphun Chiang Mai</td>
</tr>
<tr>
<td>Hungarian wax (Prik Yuak)</td>
<td>924.64</td>
<td>231.16</td>
<td>Chiang mai Ratchaburi</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55,752.32</strong></td>
<td><strong>13,938.08</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Information Technology & Communication Center : Department of Agricultural Extension

Seed amount per Hectare = 250 g.
Developments in Pepper Breeding

At Chia Tai, classical breeding and selection has been successfully applied to create:

1. Male Sterile system to create $F_1$ hybrids

2. Disease resistant varieties
   - Wet rot
   - Multiple disease resistant lines (Bacterial Wilt (BW) and Phytophthora)
   - Geminiviruses
   - Chilli Vein Mottle Virus

3. Phenotypic and physiological selection
   - Dark green leaf (less preferred by insect vector)

4. Stress tolerance
   - Heat (more than 40 °C)
Future Challenges in Pepper Breeding

1. Disease resistance focus
   - Tospovirus
     - Develop strong inoculation protocol
     - Develop resistant germplasm for all pepper varieties
   - Anthracnose
     - Develop resistant germplasm for all *Colletotrichum* sp.

2. Nutritional value
   - Identify varieties with high nutritional content
     - Functional and medicinal properties of metabolites in pepper flesh

3. Stress tolerance
   - Environmental factors (drought, salinity)
Tomato Market Overview

Market size = 1.5 ton.
Market value = 42 MB.

I. Saladette
Main area
1. CM, MHS, CR, LP (fresh) 500 kg.
2. NK, SK (factory) 500 kg.

II. Sida
Main area
1. CM, MHS 100 kg.
2. Korat (fresh) 200 kg.
Developments in Tomato Breeding

At Chia Tai, classical breeding\(^1\) and Marker Assisted Selection (MAS)\(^2\) has been successfully applied to create:

- **Multiple disease resistant varieties**
  - BW\(^1\) and Tomato Yellow Leaf Curl Virus (TYLCV)\(^1,2\)
  - BW/TYLCV\(^1,2\) + Fusarium Wilt\(^2\)
  - BW/TYLCV[1,2,3]\(^1,2\) + Fusarium Wilt\(^2\) + Late Blight\(^2\) + Bacterial Speck\(^2\)
  - BW/TYLCV[1,2,3]\(^1,2\) + Fusarium Wilt\(^2\) + Late Blight\(^2\) + Bacterial Speck\(^2\) + Nematode\(^2\)
  - BW/TYLCV[1,2,3]\(^1,2\) + Fusarium Wilt\(^2\) + Late Blight\(^2\) + Bacterial Speck\(^2\) + Nematode\(^2\) + Bacterial Spot\(^2\)

- **Phenotypic and physiological selection**
  - Color selection of Cherry Tomato (chocolate, red, pink, orange, yellow)
  - Taste selection (Brix) by refractometry

- **Stress tolerance**
  - Heat (more than 40 °C)
Future Challenges in Tomato Breeding

1. Disease resistance focus
   - Tospovirus (TNRV and CaCV)
     - Develop effective inoculation protocol
     - Develop disease resistant germplasm for all varieties
   - Insect vector resistance
     - Increase content of secondary metabolites in leaf tissue

2. Nutritional value
   - Identify varieties with high nutritional content
     - Functional and medicinal properties of metabolites in tomato flesh

3. Stress tolerance
   - Environmental factors (adapt to more tropical climates, drought, salinity)
## Eggplant Market Overview in Thailand

<table>
<thead>
<tr>
<th>Type</th>
<th>Segment</th>
<th>Area (Hec)</th>
<th>Seed (kg.)</th>
<th>Main Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thai Eggplant</td>
<td>-Chao Phraya (90%)</td>
<td>7,826</td>
<td>734</td>
<td>Phetchaburi, Ratchaburi, Kanchanaburi, Phetchaburi, Nakhon Si Thammarat</td>
</tr>
<tr>
<td></td>
<td>-Other Segment (10%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Cylindrical</td>
<td>-Long Green(95%)</td>
<td>2,054</td>
<td>193</td>
<td>Phetchaburi, Songkhla, Nan, Phitsanulok, Ratchaburi, Chaiyaphum</td>
</tr>
<tr>
<td></td>
<td>-Long Purple (5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Type</td>
<td>Ex. Short Cylindrical</td>
<td>1,183</td>
<td>111</td>
<td>Ratchaburi, Khon Kaen, Phichit</td>
</tr>
<tr>
<td></td>
<td>Turkey berry (Solanum torvum)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11,064</td>
<td>1037</td>
<td></td>
</tr>
</tbody>
</table>

Source: Information Technology & Communication Center: Department of Agricultural Extension

Seed amount per hectare = 93.75 gm.
Developments in Eggplant Breeding

At Chia Tai, classical breeding and selection has been successfully applied to create:

1. Disease resistant varieties
   • BW + Geminiviruses

2. Phenotypic and physiological selection
   • Color, size and taste for specific markets
Future Challenges in Eggplant Breeding

Disease resistance focus
- Develop high resistant BW and Geminivirus hybrids and other desirable phenotypes
Summary and Future Directions

• Classical breeding and Marker Assisted Selection (MAS) has been successfully used to develop Solanaceous crops with disease resistance and stress tolerance

• Chia Tai will complement our classical breeding program with enhanced biotechnology capabilities

Thank you