The production and uses of litchis in China

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Guidelines

1. Production status of litchi
2. Major litchi cultivars and their uses
3. Major constraints
4. Our efforts
1. Production status of litchi

The major litchi production areas:

- USA: Florida, Hawaii
- Brazil: Sao Paulo
- South Africa Madagascar Mauritius
- Australia
- China Bangladesh India Israel Nepal Thailand Vietnam

North America

South America

Europe

Africa

Asia

Australia

China
Bangladesh
India
Israel
Nepal
Thailand
Vietnam
The world litchi production (2003)

- **Australia**: 1600hm², 4000t
- **Bangladesh**: 4800hm², 13000t
- **China mainland**: 580,000hm², 1,558,400t (2004), 66.33%
- **China Taiwan**: 12000hm², 110,000t
- **India**: 62,000hm², 520,000t
- **Madagascar**: 3000hm², 30000t
- **Nepal**: 2400hm², 14000t
- **South Africa**: 2000hm², 8000t
- **Thailand**: 24,000hm², 82000t
- **Vietnam**: 12,000hm², 10,000t
- **World total production**: 2,349,400t

(Source: Julian, 2004; Yen, 2004; Huang, 2004; Mitra, 2004; Hoa, 2005)
China is the origin and the biggest producer of litchi fruit. Litchis are commercially growing in Guangdong, Guangxi, Hainan, Fujian, Yunnan and Sichuan.
## Litchi production in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Planting area/hm²</th>
<th>Fruiting area/hm²</th>
<th>Production /000 tons</th>
<th>Yielding on fruiting area (kg/hm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>590750</td>
<td>263879</td>
<td>891.9</td>
<td>3380</td>
</tr>
<tr>
<td>2001</td>
<td>584372</td>
<td>296273</td>
<td>958.7</td>
<td>3240</td>
</tr>
<tr>
<td>2002</td>
<td>570836</td>
<td>337910</td>
<td>1523.3</td>
<td>4510</td>
</tr>
<tr>
<td>2003</td>
<td>559100</td>
<td>311187</td>
<td>1123.8</td>
<td>3610</td>
</tr>
<tr>
<td>2004</td>
<td>599922</td>
<td>197284</td>
<td>1558.4</td>
<td>7899</td>
</tr>
<tr>
<td>2005</td>
<td>580800</td>
<td>--</td>
<td>1350.0</td>
<td>--</td>
</tr>
<tr>
<td>2006</td>
<td>580000</td>
<td>--</td>
<td>144.0</td>
<td>--</td>
</tr>
</tbody>
</table>
- Number of litchi farmers: estimated 600,000.
- Size of litchi orchards: 0.1~10hm²
- Employment: 1.8 million labors
<table>
<thead>
<tr>
<th>Year</th>
<th>Export amount/t</th>
<th>Export value /000USD</th>
<th>Import amount/t</th>
<th>Import value /000USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>6831.8</td>
<td>3710.75</td>
<td>311.4</td>
<td>568.84</td>
</tr>
<tr>
<td>1996</td>
<td>2577.4</td>
<td>2314.17</td>
<td>1277.5</td>
<td>3153.78</td>
</tr>
<tr>
<td>1997</td>
<td>6216.3</td>
<td>4787.67</td>
<td>699.9</td>
<td>1826.97</td>
</tr>
<tr>
<td>1998</td>
<td>2902.6</td>
<td>2989.84</td>
<td>256.9</td>
<td>597.86</td>
</tr>
<tr>
<td>1999</td>
<td>6720.3</td>
<td>12762.82</td>
<td>2444.5</td>
<td>6752.28</td>
</tr>
<tr>
<td>2000</td>
<td>4336.7</td>
<td>2827.83</td>
<td>4125.0</td>
<td>10156.36</td>
</tr>
<tr>
<td>2002</td>
<td>41733.2</td>
<td>6962.0</td>
<td>3172.0</td>
<td>8431.5</td>
</tr>
<tr>
<td>2003</td>
<td>11301.7</td>
<td>4051.73</td>
<td>9923.7</td>
<td>2358.37</td>
</tr>
<tr>
<td>2004</td>
<td>47397.5</td>
<td>9652.77</td>
<td>54501.1</td>
<td>5455.58</td>
</tr>
</tbody>
</table>
The most important litchi areas are west Guangdong and south-east Guangxi.

Guangxi-Qinzhou: 94,000 hectares, 138,000 tons; Yulin: 76,000 hectares, 58,000 tons; Guigang: 22,000 hectares, 40,000 tons; Nanning: 17,400 hectares, 38,000 tons. Subtotal: 29,800 hectares, 276,000 to 400,000 tons.

Fujian: 39,200 hectares, 162,000 tons; East Guangdong: 60,000 hectares, 170,000 tons. Subtotal: 99,200 hectares, 332,000 tons.

Mid Guangdong: Guangzhou: 34,500 hectares, 40,500 tons; Dongguan: 5,400 hectares, 8,600 tons; Shenzhen: 6,700 hectares, 7,900 tons. Subtotal: 46,600 hectares, 57,000 tons.

West Guangdong: Maoming: 111,000 hectares; Yangjiang: 37,600 hectares, 87,200 tons; Zhangjian: 17,900 hectares, 66,800 tons. Subtotal: 166,500 hectares, 532,400 tons.

Hainan: 32,400 hectares, 80,000 tons.

376,500 hectares, 64.8%, 932,400 tons, 64.3%. The most important litchi areas are west Guangdong and south-east Guangxi.
Litchi prices vary among regions from time to time.

Influences:
- production;
- cultivars and quality;
- mature stage;
- sales channels;
- regions;
- processing.

Low price area:
RMB 0.80~2.00 lower than other regions.
Litchi processing capacity in major areas:
About 90,000t, 7.8%

Production: 274000t;
Canning and juices: 20000t, 5%

Production: 160,000t;
Canning: 20,000t, 12.5%

Production: 68,000t;
Drying: 5000t, 7.3%

Production: 550,000t
Drying and wine: 45,000t, 8.1%

Production: 80000t
No processing.
2. Major litchi cultivars and their uses

- The major cultivars
  - **Early**: Sanyuehong, Baitangying, Baila, Feizixiao,
  - **Mid**: Feizixiao, Heiye
  - **Late**: Guiwei, Nuomici, Huaizhi, Shuangjianyuhebao

- The production areas:
  - **Early**: Hainan, west Guangdong
  - **Mid to late**: middle and east Guangdong, Guangxi, south Fujian
  - **Late to very late**: north Fujian, Sichuan
Guiwei (Kwai May)
60,000hm²(10.3%), mid to late.
Excellent eating quality.
For fresh and drying.
Difficult to keep and transport.

Nuomici (No Mi Ci)
60,000hm²(10.3%), late.
Excellent eating quality.
For fresh and drying.
Susceptible to fruit cracking,
Difficult to keep and transport.
**Heiye (Hak Yip)**
205,000hm² (35.3%), early,
Regular bearing and high yielding
Good quality,
Easy to store and transport
For export and for canning and juices.

**Huaizhi (Wai Chee)**
190,000hm² (32.7%), late,
Regular bearing and high yielding,
Good quality, clean flesh,
Easy to store and transport,
For export and for canning and jam.
Flesh color impacts litchi processing
3. Major constraints

- Supply over demand
  - Limited overseas market: 25,000t (Julian, 2004)
  - Limited consuming population
  - Limited transportation capacity

- High cost and low profit
  - High labor cost;
  - Low yield;
  - Low price of fruit.
Lack of infrastructures
- Irrigation and fertilization system;
- Cold chain especially cold rooms;
- Processing facilities.

Lack of bank supporting system
- For orchard management;
- For post-harvest handling and processing.

Safe environment and safe products
- Pests and diseases
- Chemical residues
Major pests and diseases in litchi

- **Pests**: more than 120 species
  - Litchi stem-end borer (*Conopomorpha sinensis* Bradley)
  - Litchi stinkbug (*Tessaratoma papillosa* Drury)
  - Thrips
  - Scales
  - Litchi hairy mite (*Aceria litchii*)

- **Diseases**
  - Litchi downy blight disease
  - Anthracnose
Litchi stem-end borer
*Conopomorpha sinensis* Bradley
Litchi stinkbug
*Tessaratoma papillosa*, causing fruit drop
Scales affecting leaf photosynthesis
The litchi erinose mite, litchi hairy mite

Aceria litchii
Thrips
*Selenothrips rubirocintus*
红带网纹蓟马
Litchi downy blight disease causing fruit drop, and affecting flowers and leaves.
Colletotrichum gloeosporioides

Pepper spot: pre-harvest

Post-harvest
Litchi export

- **Strict conditions for treatment.**
  - To Europe: cold chain, by air, by ship
  - To southeast Asia and Canada: cold chain, by ship
  - To USA, Australia: 1.38°C for 18 days.
  - To Japan: Steaming until fruit core temperature of 48°C for 16 min

- **Certificated litchi farms.**
4. Our efforts

- Research funds:
  - 17.035 million yuan (USD2.12 million) were input from all levels of Chinese governments during 1996 and 2006.
  - 16.16 million yuan (USD2.15 million) has been planned from 2006 to 2010 from the state.
Research and industry focus

- Industry re-orientation
  - Increasing litchi processing especially juice making
  - Reducing tree numbers via thinning of trees
- Orchard re-construction
  - Simplifying cultivars
  - Installment of irrigation and fertilization systems
  - Construction of cold rooms
  - Construction of post-harvest treatment systems
- The integrated pest management (IPM)
The integrated pest management (IPM)

- Planting system:
  - inter-planted cultivars → single cultivars
  - densely planting → tree thinning
- Use of natural enemies
- Biological control combined with sound orchard management, eg. Pruning of infested branches or leaves.
Chemical controls

- **During winter flushing period:** suppression of leaf flushes, the overwintering insect and mite pests.
- **During flowering period:** control of litchi stinkbug, erinose mite, trichlorfon is used in combination with chlorbenside for downy blight disease two times.
During fruitlet period: control of stem-end borer and litchi stinkbug, with cypermethrin or chlorpyrifos plus trichlorfon; Ridmil-MA or Sandofan for downy blight, until fruit maturation period.

During autumn flushing period: protecting from stem-end borer, erinose mite, leaf midge and carious lepidopterous caterpillars, spray with isocarbophosphos or acephate, with 10-15 days apart.
Control of major pests and disease

<table>
<thead>
<tr>
<th>Pests and disease</th>
<th>Chemicals</th>
<th>Usage spraying with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litchi downy blight disease</td>
<td>Mancozeb (Ridomil-MZ)</td>
<td>1030~1400 mg/kg 312.5 ~375 mg/kg</td>
</tr>
<tr>
<td>Litchi stinkbug</td>
<td>Cypermethrin</td>
<td>25~50 mg/kg</td>
</tr>
<tr>
<td>Litchi stem end borer</td>
<td>Chlorpyrifos+Cypermethrin</td>
<td>86.67~130 mg/kg</td>
</tr>
</tbody>
</table>

Excerpt from NY/T 5174-2002 Technical guidelines in litchi production
China Agricultural Industry Standard, 2002
### The standards of chemical residues in litchi (‘no-harm’ food products)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Standard/(mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>deltamethrin</td>
</tr>
<tr>
<td>2</td>
<td>fenvalerate</td>
</tr>
<tr>
<td>3</td>
<td>cypermethrin</td>
</tr>
<tr>
<td>4</td>
<td>cyhalothrin</td>
</tr>
<tr>
<td>5</td>
<td>trichlorphon</td>
</tr>
<tr>
<td>6</td>
<td>dichlorvos</td>
</tr>
<tr>
<td>7</td>
<td>dimethoate</td>
</tr>
<tr>
<td>8</td>
<td>amitraz</td>
</tr>
<tr>
<td>9</td>
<td>phosmet</td>
</tr>
<tr>
<td>10</td>
<td>chlorpyrifos</td>
</tr>
</tbody>
</table>

Excerpt from NY/T 5173-2002 No harm food Litchi.
China Agricultural Industry Standard, 2002
More and more use of natural enemies: spider, parasitic wasp, etc.
Conclusions

1. Litchi is one of the most important fruit crops in southern China, mainly relying on domestic market; main constraints for export are post-harvest treatment procedures and chemical residues.

2. Processing is an urgent solution for supply-over-demand issues in China’s litchis.

3. Food safety issue may need comprehensive ways to tackle with.