Breeding and Diversified Utilization Research on Polyploid Hybrid Mulberry Varieties

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In the world, China is a country with the largest area of mulberry field and the highest output of fresh cocoon and raw silk.
The challenges of China sericulture

- The development of urbanization
- Lack of rural labor (silkworm rearing labor)
- Decline of Comparative economic benefits
- Climate changes and chemicals, etc.
How to Match the Need of Sericulture?

- Breeding of multi-purpose mulberry variety
- Breeding of multi-purpose silkworm variety
- Developing labor-saving technique for planting and rearing
- Developing comprehensive utilization of sericulture resource
- Others ... ...
Diversified utilization

Silkworm rearing

Mulberry

Diversified utilization
Research Focus

◆ Breeding multi-purpose polyploid mulberry varieties
◆ Developing diversified utilization of polyploid mulberry varieties
Breeding objective

Germplasm collection

Germplasm evaluation

Polyploid creation

Parents selection

Polyplloid variety

Crossing technique & method

Breeding objective

Polyploid creation

Germplasm evaluation

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Polyplloid variety

Crossing technique & method
Polyploid germplasm resources induced by colchicine

Young seedlings are treated by colchicine for 3-5d.

Survival rate: 70%—80%

Induction frequency: 1.5%—15%

Key factors: Seedling growth phase, Colchicine concentration, Treatment time

chromosome doubling
320 polyploid germplasm resources had been created by colchicine induction
Evaluation of polyploid mulberry germplasm

Agronomic Characters
- Tree shape
- Branch diameter and Length
- Leaf shape
- ...

Economic Characters
- Weight of one piece of leaves
- One fruit weight
- Leaf length and width
- ...

Nutrient Composition
- Crude protein
- Amino acid
- fat
- Vitamin C
- ...

Functional components
- Anthocyanin
- Flavone
- Polyphenol
- Polysaccharide
- Resveratrol
- ...

Disease Resistance
- Bacterial wilt
- Red rust
- Bacterial Blight
- Sclerotinia
65 cross combinations

Comparison tests

Field tests

Government authentication

2 polyploid varieties were released
1. Polyploid Hybrid Mulberry Variety **Yuesang 11**

<table>
<thead>
<tr>
<th>Average leaf yield (kg/ha)</th>
<th>Moisture content (%)</th>
<th>Crude protein content (%) (DW)</th>
<th>Soluble sugar content (%) (DW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63,000</td>
<td>78.11</td>
<td>28.2</td>
<td>7.33</td>
</tr>
</tbody>
</table>

Be planted widely in China and be introduced into Thailand, Vietman, India, Burma, Turky, Egypt, Cuba and other countries.
### Yuesang 11 for Silkworm

<table>
<thead>
<tr>
<th>Variety</th>
<th>Leaves yield of 1 hectare</th>
<th>Cocoon yield of 100kg mulberry leaves</th>
<th>Cocoon yield of 1,000 silkworms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuesang 11</td>
<td>63,000kg (+26%)</td>
<td>8.49kg (+8.4%)</td>
<td>1.81kg (+7.1%)</td>
</tr>
<tr>
<td>CK</td>
<td>50,000kg</td>
<td>7.83kg</td>
<td>1.69kg</td>
</tr>
<tr>
<td>Nutrient</td>
<td>Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary Fibre</td>
<td>4.10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td>22.36 mg/100g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carotenoid</td>
<td>5.31 mg/100g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soluble protein</td>
<td>0.40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soluble sugar</td>
<td>1.44%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saccharose</td>
<td>0.58%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total phenols</td>
<td>0.36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total flavonoids</td>
<td>0.47%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Yuesang 11 for vegetable**

**Excellent Taste and Flavor**
<table>
<thead>
<tr>
<th>Sample</th>
<th>Crude Protein (%)</th>
<th>Crude Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulberry leaves powder</td>
<td>27.2~28.5</td>
<td>4.5~5.2</td>
</tr>
<tr>
<td>Alfalfa meal powder(CK)</td>
<td>17.8~20.1</td>
<td>2.2~3.5</td>
</tr>
</tbody>
</table>

Yuesang 11 for livestock

Improve Meat Quality and Flavor
Mulberry Feed Production Line
2. Triploid Mulberry Variety Yueshenda 10

- It is a multi-purpose variety for fruit, silkworm, vegetable, tea and feed
- Be planted all over China
### Fruit yield and quality of Yueshenda 10

<table>
<thead>
<tr>
<th>The number of fruits per bud</th>
<th>Weight of single fruit (g)</th>
<th>Fruit yield (kg/ha)</th>
<th>Juice percentage (%)</th>
<th>Sugar percentage (%)</th>
<th>Anthocyanin (mg/L)</th>
<th>Vc (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3～8</td>
<td>3.2～5.2</td>
<td>22,500～30,000</td>
<td>78～84.0</td>
<td>9～15</td>
<td>1040～1280</td>
<td>1.1～1.3</td>
</tr>
</tbody>
</table>
Products from Fruit of Yueshenda 10

- Wine
- Juice
- Vinegar
- Jam
Products from leaves of Yueshenda 10
Economic benefit is increased by more than 50%
THE SILK ROAD ON THE LAND

THE SILK ROAD ON THE SEA

Silk Road Economic Belt and 21st-Century Maritime Silk Road
Thank You

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