Paddy Cultivation in Sri Lanka

By

Mr. G.D.U Jayawardena
Origin of rice plant

Evidence says in China or in India

Species

- 22 species are documented in the world
  - 20 wild species and 2 cultivated species
    - 2 cultivated species are
      - *Oryza sativa* (L.)
      - *Oryza glaberrima* (stedu)
Available species in Sri Lanka

- 5 wild rices
  - O. nivara
  - O. rufipogon
  - O. risomatics
  - O. echinari

- Cultivated species
  - O. sativa
    - Group indica

Distribution of rice in Sri Lanka
Rice Extent...

- Sri Lanka - 730,000 ha
- Dry & Intermediate - 610,000 ha
- Wet Zone - 120,000 ha
### Districts

<table>
<thead>
<tr>
<th>District</th>
<th>Agro ecology</th>
<th>Av. Yield Bu/Ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalutara</td>
<td>WL1a, WL1b, WL2a</td>
<td>56</td>
</tr>
<tr>
<td>Colombo</td>
<td>WL1a, WL1b, WL2a, WL3</td>
<td>63</td>
</tr>
<tr>
<td>Galle</td>
<td>WL1a, WL2a</td>
<td>72</td>
</tr>
<tr>
<td>Gampaha</td>
<td>WL1a, WL1b, WL2b, WL3</td>
<td>66</td>
</tr>
<tr>
<td>Rathnapura</td>
<td>WL1a, WL2a</td>
<td>59</td>
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<tr>
<td>K’galle</td>
<td>WL1a, WL2b,</td>
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</tr>
<tr>
<td>Matara</td>
<td>WL1a, WL2a</td>
<td>73</td>
</tr>
</tbody>
</table>

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**Until 1950 used Traditional methods**
Traditional methods

- 1. Traditional rice varieties
- 2. Conventional land preparation
- 3. Organic fertilizer
- 4. “Kem” methods for pest and Disease control
- 5. Traditional harvesting, processing and storing methods
Land preparation using mamoty

Rural Agricultural Community Affair
Traditional Rice Varieties

- 600 varieties were reported
Gonabaru
Kahatawee

Sudu heenati
Due to scarcity of lands and increase of the population, the Agricultural Department takes action to develop technology to increase the rice production.

**Varietal development**

- Breeding objectives:
  - Increase yield potential
  - Incorporation of pest and disease resistance
  - Semi dwarf plant type
  - Response to fertilizer
  - Better grain quality
Breeding Commence 1950

First bred variety named as H4

H- Hybridized

There are four Breeding Stations

<table>
<thead>
<tr>
<th>Station</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Batalagoda</td>
<td>Bg</td>
</tr>
<tr>
<td>Bombuwala</td>
<td>Bw</td>
</tr>
<tr>
<td>Labuduwa</td>
<td>Ld</td>
</tr>
<tr>
<td>Ambalantota</td>
<td>At</td>
</tr>
</tbody>
</table>
Rice Research & Development Institute

Rice researchers centers

Paranthan (RRS)
Polonnaruwa (ARU)
Ampara (RRS)
RRDI (HQ) - Batalagoda
Bomboewela (RARDC)
Bentota (RRS)
Labuduwa (RRS)
Ambalantota (RRS)
Institution Mandate

Batalagoda (Varietal development & technology generation)
- Dry & Int. Zones
- High potential areas

Bombuwela (Varietal development & technology generation)
- Wet zone
- Problem soils
- Red rice

Labuduwa (Varietal development & technology testing)
- LCWZ Mineral soils

Ambalantota (Varietal development & technology generation)
- Salinity
- Red rice

Bentota (Technology testing)
- Coastal salinity
- Floods and submergence

Polonnaruwa (Technology testing)
- High potential areas

Ampara (Technology testing)
- High potential areas

<table>
<thead>
<tr>
<th>4 ½ Months</th>
<th>4 Months</th>
<th>3 ½ Months</th>
<th>3 Months</th>
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<tbody>
<tr>
<td>Bg 379-2</td>
<td>Bw 400</td>
<td>Bg 350</td>
<td>Bg 300</td>
</tr>
<tr>
<td>Bg 11-11</td>
<td>Bg 401</td>
<td>Bw 351</td>
<td>Bg 301</td>
</tr>
<tr>
<td>Bg 450</td>
<td>At 402</td>
<td>Bg 352</td>
<td>Bw 302</td>
</tr>
<tr>
<td>Bw 451</td>
<td>Bg 403</td>
<td>At 353</td>
<td>At 303</td>
</tr>
<tr>
<td>Bw 452</td>
<td>Bg 405</td>
<td>At 354</td>
<td>At 304</td>
</tr>
<tr>
<td>Bw 453</td>
<td>Bg 407(H)</td>
<td>Ld 355</td>
<td>Bg 305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ld 356</td>
<td>Ld 356</td>
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<tr>
<td></td>
<td></td>
<td>Bg 357</td>
<td>Bg 306</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bg 358</td>
<td>At 306</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bg 359</td>
<td>At 307</td>
</tr>
<tr>
<td></td>
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<td>Bg 360</td>
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<td></td>
<td></td>
<td>Bw 361</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>At 362</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Bw 363</td>
<td></td>
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<td></td>
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<td>Bw 364</td>
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</table>
Constraints ...

a) soil constraints (30 - 50%)
- Acidic
- Fe, Mn and Al toxicities
- Organic matter/Sandy
- Deficiencies - Zn, Si
- Salinity
Fe Toxic soil

Fe Toxic Paddy field
Fe Toxic symptom in Rice plant

Fe Toxic condition in Paddy filled
Constraints

b) Climatic constraints

- High rainfall
- High temperature
- High humidity
- Low sunlight intensity
- High wind

Breeding Objectives...

General objectives:

- Increase yield potential
- Pest and disease resistance
- Acceptable grain characteristics
- Short age (3 & 3.5 m)
- Medium plant height (100-110cm) / Non lodging
Objectives…

Specific Objectives

- High seedling vigor
- Tolerance to adverse soils
  - Fe toxicity
- Wide adaptability to diverse environment
- Red rice/red samba

On Going Activities

- Rice varietal improvement through Conventional breeding techniques
  a) Hybridization
  b) Mutation
Killing Pollan (using hot water)

Ready for the Hybridization
Present new objectives

- Improvement of nutritional status for promoting health

What are the Health Promoting Functional Properties of Rice?

I. Micronutrient deficiencies - iron deficiency anemia
   - affect all age groups in the country
   - influence the productivity
   - economic loss estimated 1.1% of GDP per capita
   *** Phytates and tannins reduced the bio availability of iron in grains

Therefore important to identify high iron varieties with low phytates and tannings
2. Diabetic condition

High fiber content reduces the GI and reduces absorption of glucose by the body.

Therefore important to identify low GI varieties

Cont .....

3. Cardio-vascular diseases

Rice bran contain natural antioxidants such as oryzanol and tocotrienols.

This property also reduces the cardio-vascular diseases
Tank, Village & Temple

Granary of the East
Old

- Low yield
- Low fertilizer Response

New

At present

- Rehabilitation & Reconstruction of Irrigation Systems
Rehabilitation & Reconstruction of Irrigation Systems

The Present

- Rehabilitation & Reconstruction of Irrigation Systems
### Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Production 000 Mt</th>
<th>Yield bu/ac</th>
<th>% Imports</th>
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</thead>
<tbody>
<tr>
<td>1940</td>
<td>980</td>
<td>13</td>
<td>60</td>
</tr>
<tr>
<td>1950</td>
<td>970</td>
<td>34</td>
<td>50</td>
</tr>
<tr>
<td>1960</td>
<td>1242</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td>1970</td>
<td>1539</td>
<td>49</td>
<td>25</td>
</tr>
<tr>
<td>1980</td>
<td>1748</td>
<td>66</td>
<td>10</td>
</tr>
<tr>
<td>1990</td>
<td>1993</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>2005</td>
<td>3000</td>
<td>82</td>
<td>1</td>
</tr>
</tbody>
</table>

- 100 kg - Per capita rice consumption per year
- 45% carbohydrates
- 40% protein
National production and yield

Yield t/ha

Production m.t

Year

0 0.5 1 1.5 2 2.5 3 3.5 4 4.5
0 1 1.5 2 2.5 3 3.5 4 4.5
2005

Cost of Production
2005

Labour 51%
Inputs 29%
Power 20%
Varietal spread according to the age group 2005

National rice varietal spread %

<table>
<thead>
<tr>
<th>Variety</th>
<th>1995</th>
<th>1997</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bg 300</td>
<td>19.7</td>
<td>22.3</td>
<td>20.58</td>
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<tr>
<td>Bg 352</td>
<td>7.7</td>
<td>11.3</td>
<td>12.86</td>
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<tr>
<td>Bg 94-1</td>
<td>12.5</td>
<td>14.4</td>
<td>10.12</td>
</tr>
<tr>
<td>Bg 450</td>
<td>6.5</td>
<td>5.9</td>
<td>5.21</td>
</tr>
<tr>
<td>Bg 379/2</td>
<td>6.8</td>
<td>3.8</td>
<td>5.74</td>
</tr>
<tr>
<td>Bg 350</td>
<td>8.0</td>
<td>5.9</td>
<td>5.42</td>
</tr>
<tr>
<td>At 353</td>
<td>-</td>
<td>-</td>
<td>6.40</td>
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<tr>
<td>Ld 355</td>
<td>-</td>
<td>-</td>
<td>4.75</td>
</tr>
<tr>
<td>Bg 403</td>
<td>6.1</td>
<td>4.3</td>
<td>4.81</td>
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<tr>
<td>Bw 351</td>
<td>6.0</td>
<td>3.6</td>
<td>2.83</td>
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Rice yield under rain and irrigated

![Graph showing rice yield under rain and irrigated conditions.]

Thanks for your attention