Morphological characterization of wild rice accessions collected from Sri Lanka

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Staff involved

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Oryza

- Two cultivated species  \textit{O.sativa} (Asian)
- \textit{O.glaberima} (African)

- Twenty two wild species
  
  Contains desirable characters
Important characters

- Resistant to Blast
- Salinity
- Grassy stunt
- BPH
Sri Lankan situation

- Five species can be found in the Island
- *O. nivara* AA grassy stunt, BPH
- *O. rufipogon* AA Salinity
- *O. eichingeri* CC BPH
- *O. rhizomatis* endemic to Sri Lanka CC BPH
- *O. granulata* GG drought?
- Never use for crop improvement
Wild rice species found in Sri Lanka

*O.nivara*

*O.rufipogon*

*O.granulata*

*O.rhizomatis*

*O.eichingeri*
Reasons for not used

- No proper characterization data
Objective of the study

- Morphological characterization of collected wild rice accessions
- Develop characterization catalogue
Location

- Rice Research and Development Institute
- Batalagoda, Ibbagamuwa
Previous collection Data gathered from

- National Herbarium, Royal Botanical Garden, Peradeniya
- Plant Genetic Resources Centre, Gannoruwa
Wild rice collection

- 31 collection missions
- 14 districts
- Anuradhapura
- Badulla
- Colombo
- Galle
- Gampaha
- Hambantota
- Kalutara
- Kurunegala
- Matale
- Matara
- Moneragala
- Polonnaruwa
- Puttlam
- Rathnapura
Collections

- Live plants - morphological characterization
- Seeds
- seed multiplication
Morphological characterization

- Develop data set according to the accepted descriptor
- IRRI descriptor
Characters

01. Scientific name
02. Origin code: - (1) Sri Lanka, (2) Other countries
04. Blade pubescence-(1). glabrous, (2). intermediate, (3). pubescent
06. Leaf texture-(1). herbaceous, (2). coriaceous
07. Days to first flowering
08. Ligule pubescence-(1). glabrous, (2). hirsute in specific places, (3). generally hirsute
09. Ligule shape- (1). acute to acuminate, (2) two cleft, (3). tip round or truncate
...Characters


13. Awn length (mm)


15. Anther length (mm)-


17. Panicle type-(1).compact, (3).intermediate, (5).open, (7).descending


19. Texture of panicle axis- (1). Straight, (2).droopy


...Characters

- 23. Culm length (cm)
- 24. Panicle length (cm)
- 25. Distance from panicle base to 1st spikelet insertion (cm)
- 26. 2nd leaf width (cm)
- 27. 2nd leaf length (cm)
- 28. 2nd leaf legule length (cm)
- 30. Rhizome and stolen formation - (1). yes, (2). no
- 31. Leaf senescence - (1). late and slow, (5). intermediate, (9). early and fast
- 32. Panicle shattering - (1). very low (less than 1%), (3). low (1-5), (5). moderate (6-25%), (7). loose, (26-50%)
  - (9). high (more than 50%)
- 33. 10-Grain weight (gm)
- 34. Grain length (mm)
- 35. Grain width (mm)
- 36. Grain thickness (mm)
- 38. Life cycle
Collecting results

- No. of wild rice accessions collected: 84
- *O. nivara*: 41
- *O. rufipogon*: 21
- *O. eichingeri*: 09
- *O. rhizomatis*: 08
- *O. granulata*: 05
Plant height of different *O. nivara* accessions

Varied from 50-173 cm
Plant height of different *O. rufipogon* accessions

Varied from 40-131 cm
Plant height of different *O. eichingeri* accessions

- Varied from 45-143 cm
Plant height of different *O. rhizomatis* accessions

Varied from 65-142 cm
Plant height of different *O. granulata* accessions

Varied from 25-63 cm
Comparison

Plant height of different O.nivara accessions

Accession number

Plant height cm

Accession number

Plant height of different O.rufipogon accessions

Accession number

Plant height cm

Accession number

Plant height of different O.eichinigeri accessions

Accession number

Plant height cm

Accession number

Plant height of different O.rhizomatis accessions

Accession number

Plant height cm

Accession number

Plant height of different O.granulata accessions

Accession number

Plant height cm
Leaf length of different *O. nivara* accessions
Leaf length of different *O. rufipogon* accessions
Leaf length of different *O. eichingeri* accessions

![Bar chart showing leaf length of different O. eichingeri accessions](chart.png)
Leaf length of different *O. rhizomatis* accessions
Leaf length of different *O. granulata* accessions
Days to first flowering of different accessions of *O.nivara*
Days to first flowering of different accessions of *O. rufipogon*
Days to first flowering of different accessions of *O. eichingeri*
Days to first flowering of different accessions of *O. rhizomatis*
Days to first flowering of different accessions of *O. granulata*
Comparison

Days to first flowering of different accessions of *O.nivara*

Days to first flowering of different accessions of *O.rufipogon*

Days to first flowering of different accessions of *O.granulata*

Days to first flowering of different accessions of *O.eichingeri*
Panicle length of different *O. nivara* accessions

![Graph showing panicle length of different *O. nivara* accessions](image)
Panicle length of different *O. rufipogon* accessions

![Bar chart showing panicle length of different O. rufipogon accessions.](chart.png)
Panicle length of different *O.eichingeri* accessions

![Panicle length of different *O.eichingeri* accessions](image-url)
Panicle length of different *O. rhizomatis* accessions

![Bar chart showing panicle length of different *O. rhizomatis* accessions.](image-url)
Panicle length of different *O. granulata* accessions
Comparison

Panicle length of different *O.nivara* accessions

Panicle length of different *O.rufipogon* accessions

Panicle length of different *O.eichinigeri* accessions

Panicle length of different *O.rhizomatis* accessions

Panicle length of different *O.granulata* accessions
Findings

- *O.nivara* - found in dry and intermediate zones of Sri Lanka
- *O.rufipogon* - found in costal belt
- *O.eichingeri* and *O.rhizomatis* - found in dry and intermediate zones of Sri Lanka
- *O.granulata* - found only intermediate zone
Findings...

- Plant height, leaf length and panicle length varied according to species and accessions.
Findings...

- Awn
- Full awned: *O.nivara*
- *O.rufipogon*
- Partially awned: *O.eichingeri*
- *O.rhizomatis*
- Awn less: *O.granulata*
- Awn length and color varied according to the accessions
Findings

- Pericarp: Red
- Seed size: short round
- Intermediate bold

- O.granulata
- O.eichingeri
- O.rhizomatis
- O.nivara
- O.rufipogon
Results – published at SLAAS technical session

Collection of wild rice germplasm in Sri Lanka

Rice Research and Development Institute, Ratnapura, Badulla, Hikkaduwa
F.V. Hemachandra

Title: Collection of wild rice germplasm in Sri Lanka

Methods

Objective

Materials and Methods

Results

Conclusions

Table 1: Number of wild rice accessions collected in Sri Lanka

<table>
<thead>
<tr>
<th>Species</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oryza sativa</td>
<td>50</td>
</tr>
<tr>
<td>Oryza glaberrima</td>
<td>30</td>
</tr>
<tr>
<td>Oryza rufipogon</td>
<td>20</td>
</tr>
</tbody>
</table>

Factors

Table 2: Environmental factors affecting wild rice collection

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Well-drained, fertile</td>
</tr>
<tr>
<td>Climate</td>
<td>Warm, humid, tropical</td>
</tr>
<tr>
<td>Elevation</td>
<td>Up to 2000 meters</td>
</tr>
</tbody>
</table>

Reference


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Publications related to project activities

Sri Lanka Association for the Advancement of Science

214/B

Collection of wild rice germplasm in Sri Lanka

P V Hemachandra
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Oryza is a very important genus belongs to the family Poaceae. According to the literature this genus contains twenty wild rice species and two cultivated rice species. Previous scientists have confirmed that five wild rice species (O. invar, O. rufipogon, O. eichingeri, O. rhizomatis and O. granulata) can be found in Sri Lanka. These genetic resources are very valuable assets for the island. Due to many different reasons these valuable wild rice populations are continuously being destroyed. Therefore collection and conservation of these valuable resources are very important for future needs. Objective of this study is collection of wild rice species within Sri Lanka to fulfill this gap.

This study was carried out at Rice Research and Development Institute (RRDI), Batalagoda, Ibbagamuwa, Sri Lanka.

Twenty six collection missions were organized through out the Island except north and east to collect wild rice accessions which are belonged to five species. During the collection missions 28 O.nivara accessions, 13 O. rufipogon accessions, 09 O. eichingeri accessions, 08 O. rhizomatis accessions, 03 O. granulata accessions and 01 weedy rice accession were collected.

These results indicate that O.nivara, can be easily found in the dry and intermediate zones of the Island. O. rufipogon can be observed in the coastal belt in the wet zone. O. eichingeri and O. rhizomatis spread in the special areas of dry and intermediate zones and O. granulata found in the intermediate zone. Seeds of collected accessions were conserved at cooling cabinet at RRDI, Batalagoda, Ibbagamuwa.

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Conclusion

- These valuable resources can be used for crop improvement programme.
Acknoledgements

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Thank you