Morphological characterization of wild rice accessions collected from Sri Lanka

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Staff involved

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Oryza

- Two cultivated species *O.sativa* (Asian)
- *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

Reasons for not used

- No proper characterization data

Objective of the study

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

Location

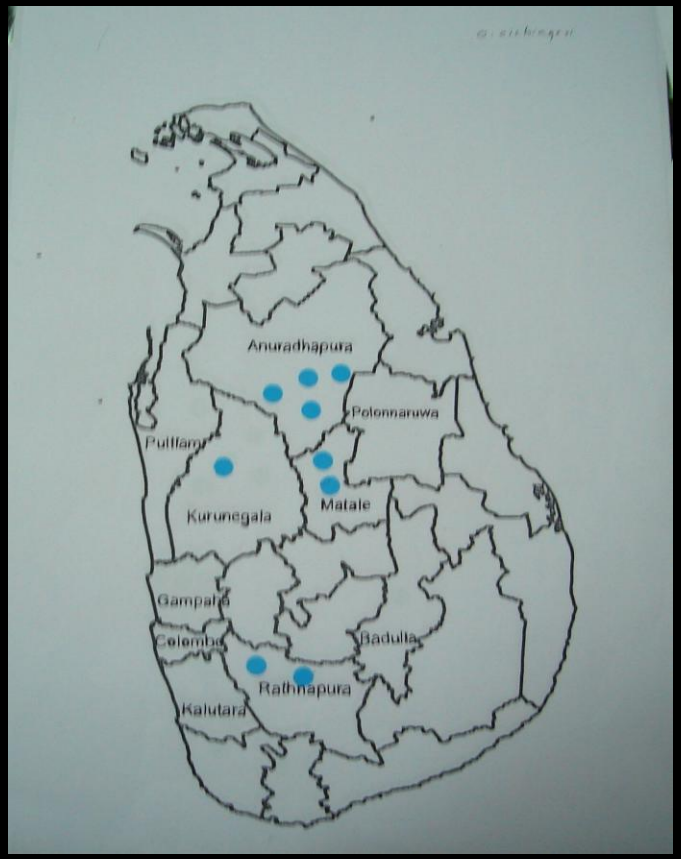
- Rice Research and Development Institute
- Batalagoda, Ibbagamuwa

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. Scintific name**
- **02. Origin code: -** (1) Sri Lanka, (2) Other countries
- **03. Basal leaf sheath color-(**1).green, (2).purple lines, (3).light purple, (4).purple
- **04. Blade pubescence-**(1).glabrous, (2).intermediate, (3).pubescent
- **05. Blade color-**(1).pale green, (2).green, (3).dark green, (4).purple tips, (5).purple margin, (6).purple blotch(7).purple
- **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

- **10. Lemma & palea color- (**0).straw,(1).gold & gold furrow on straw , (2).brown spots on straw , (3).brown furrows on straw, (4).brown (tawny), (5).red, (6).purple spots on straw, (7).purple furrows on straw, (8).purple edged Lemma & purple spot on hall, (9).purple, (10).black
- **11. Awn presence-** (0).absent, (1).short & partly awned, (2).short & fully awned, (3).long and partly awned, (4).long and fully awned
- **12. Awn color-** (1).straw, (2).gold, (3).brown (towny), (4).red, (5).purple, (6) black
- **13. Awn length (mm)**
- **14. Stigma color**- (1).white, (2).light green, (3).yellow, (4).brown, (5).light purple, (6).purple
- **15. Anther length (mm)-**
- **16. Flag leaf angle-** (1).erect, (3).intermediate, (5).horizontal, (7).descending
- **17. Panicle type**-(1).compact, (3).intermediate, (5).open, (7).descending
- **18. Panicle exsertion**- (1).well exserted, (3).moderately well exserted, (5).just exserted (7).partly exserted, (9).enclosed
- **19. Texture of panicle axis**- (1). Straight, (2).droopy
- **20. Secondry branching of panicle**-(0).absent, (1).light, (2).heavy, (3) clustering
- **21. Culm angle-** (1).erect, (3).intermediate, (5).open, (7).spreading, (8).procumbent

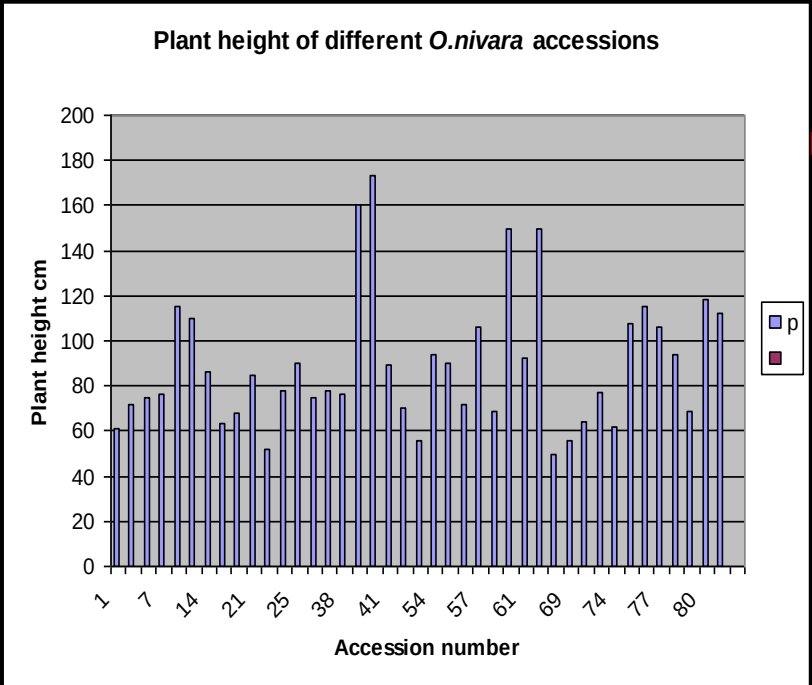
…Characters

- **22. Node color-** (1).green, (2).light gold, (3).purple lines, (4).purple
- **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)**
- **29. Culm strength**- (1).strong, (3).moderately strong, (5).intermediate, (7).weak (9). Very weak
- **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)**
- **37. Seed coat color-** (1).white, (2).light brown, (3).speckled brown, (4).brown, (5).red, (6),variable purple, (7).purple
- **38. Life cycle**

Collecting results

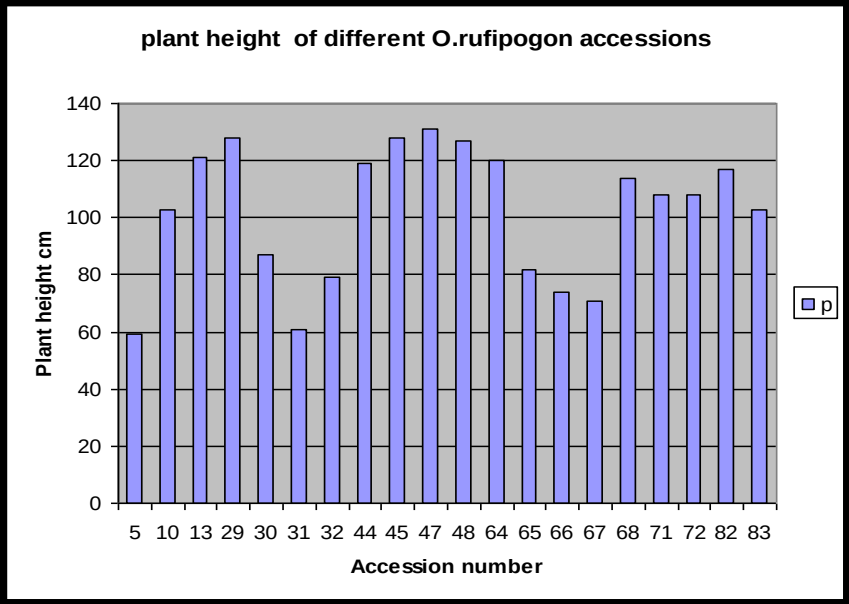
- No.of wild rice accessions collected 84
- *O.nivara* 41
- *O.rufipogon* 21
- *O.eichingeri* 09
- *O.rhizomatis* 08
- *O. granulata* 05

Plant height of different *O.nivara* accessions



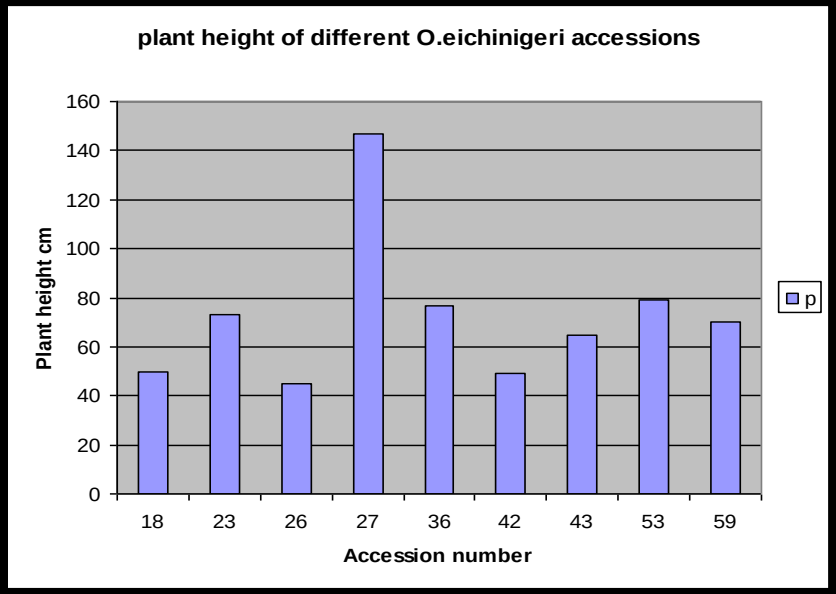
- Varied from 50-173 cm

Plant height of different *O.rufipogon* accessions



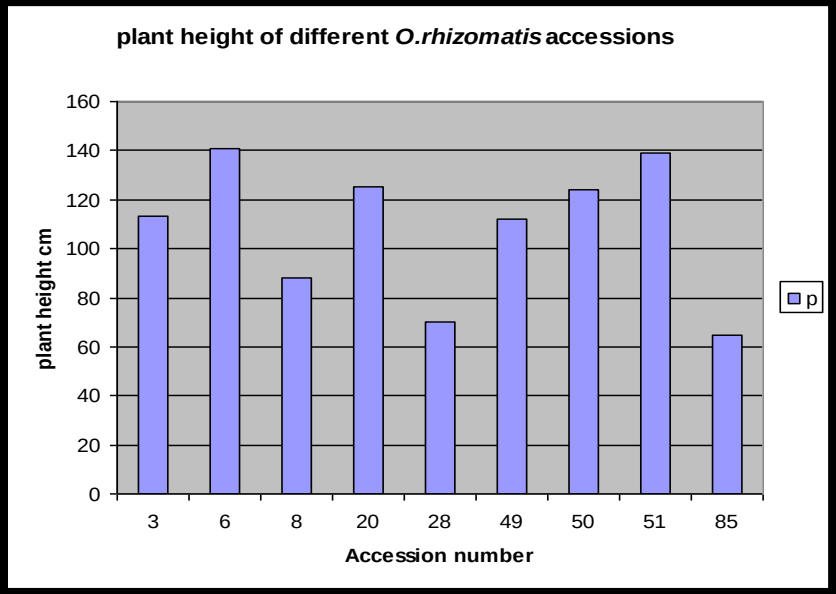
Varied from 40-131 cm

Plant height of different *O.eichingeri* accessions



- Varied from 45-143 cm

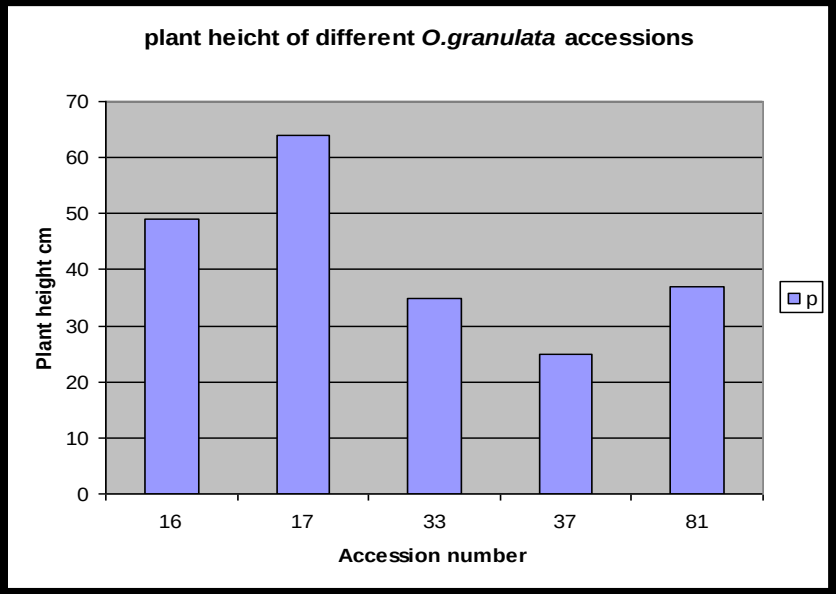
Plant height of different *O.rhizomatis* accessions



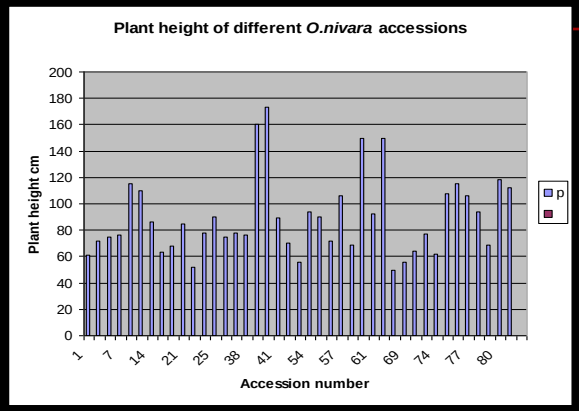
- Varied from 65-142 cm

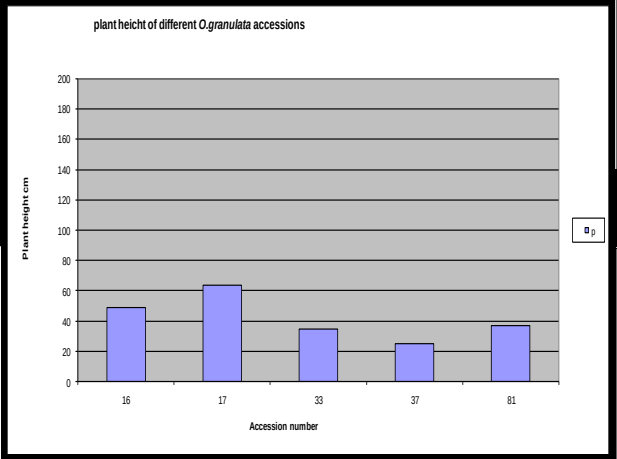
Plant height of different *O.granulata* accessions

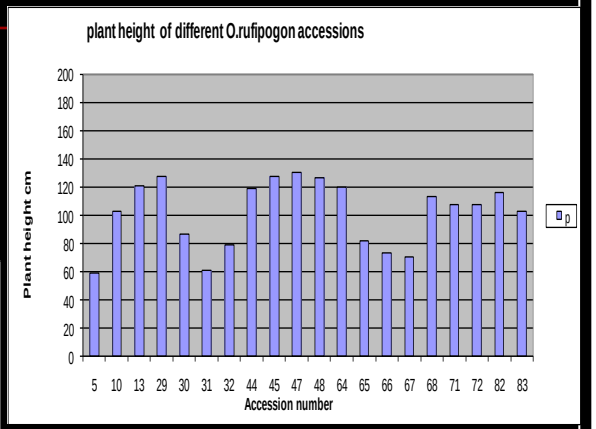
- Varied from 25-63 cm

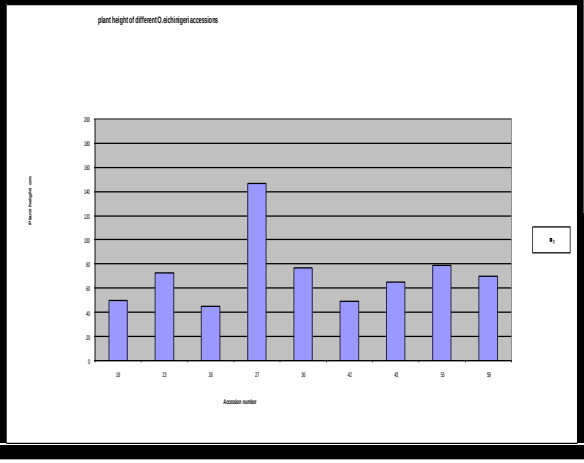


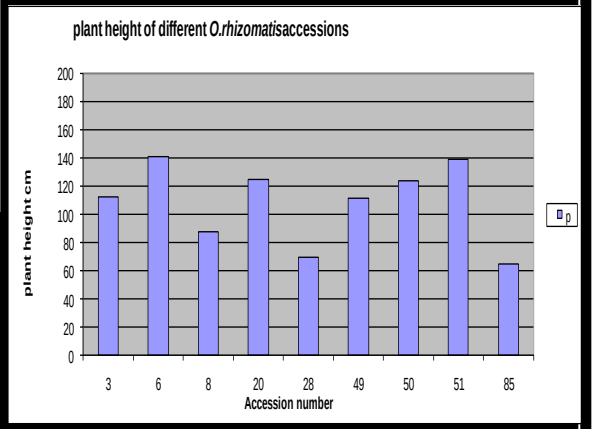
Comparison


Plant height of different O.nivara accessions
Plant height cm
Accession number
p

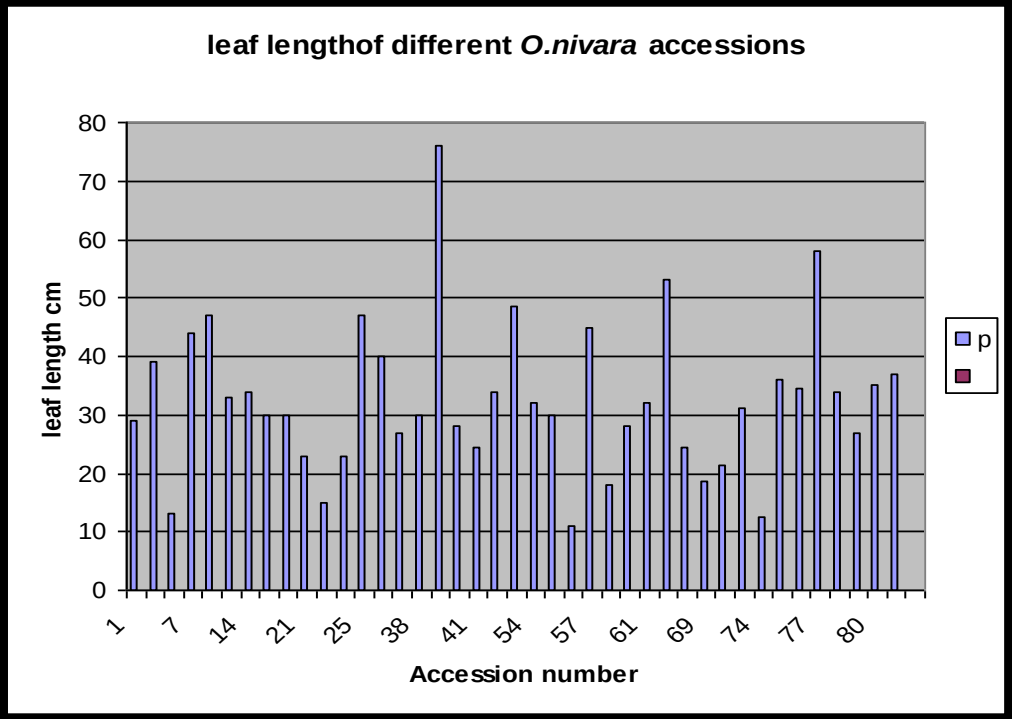

plant heicht of different O.granulata accessions
Plant height cm
Accession number
p


plant height of different O.rufipogon accessions
Plant height cm
Accession number
p

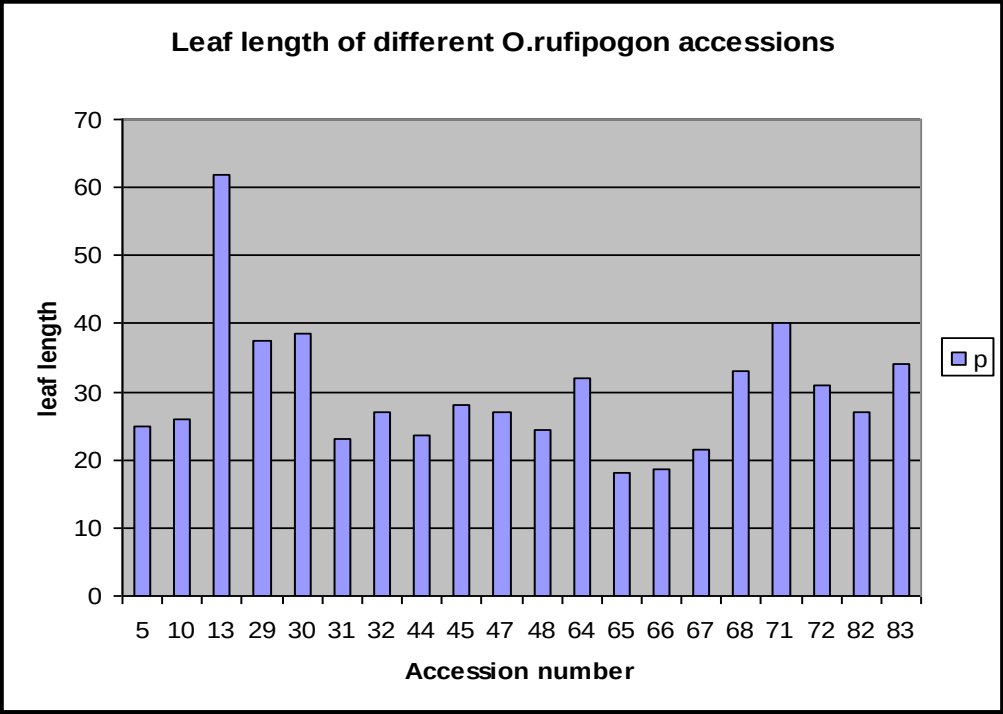

plant height of different O.eichingeri accessions


plant height of different O.rhizomatisaccessions
plant height cm
Accession number
p

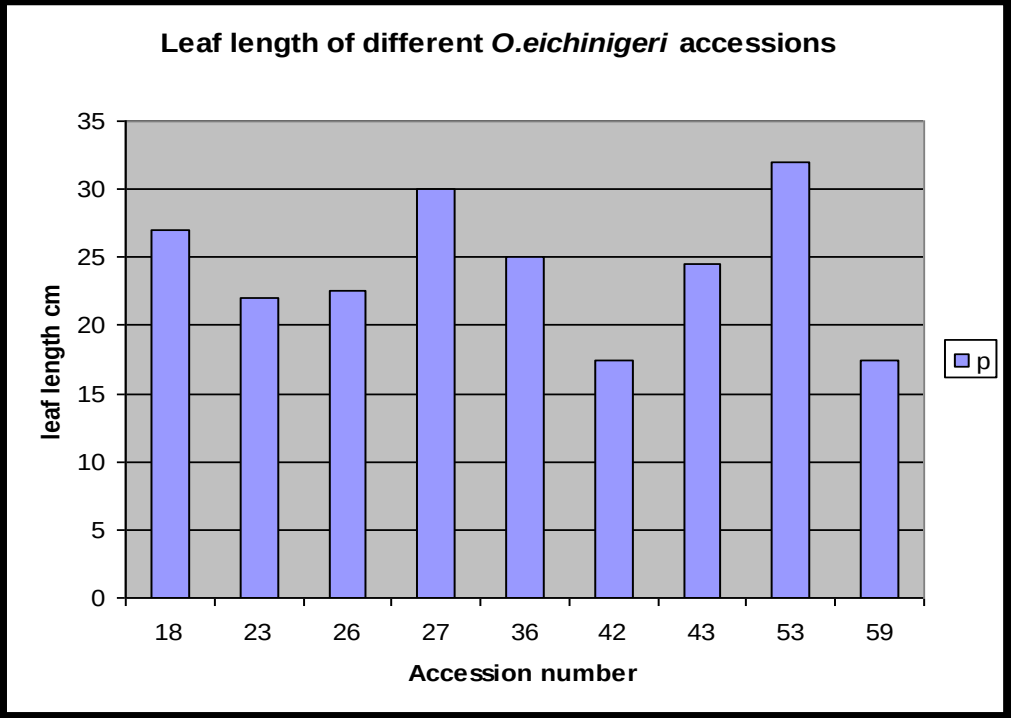
Leaf length of different *O.nivara* accessions



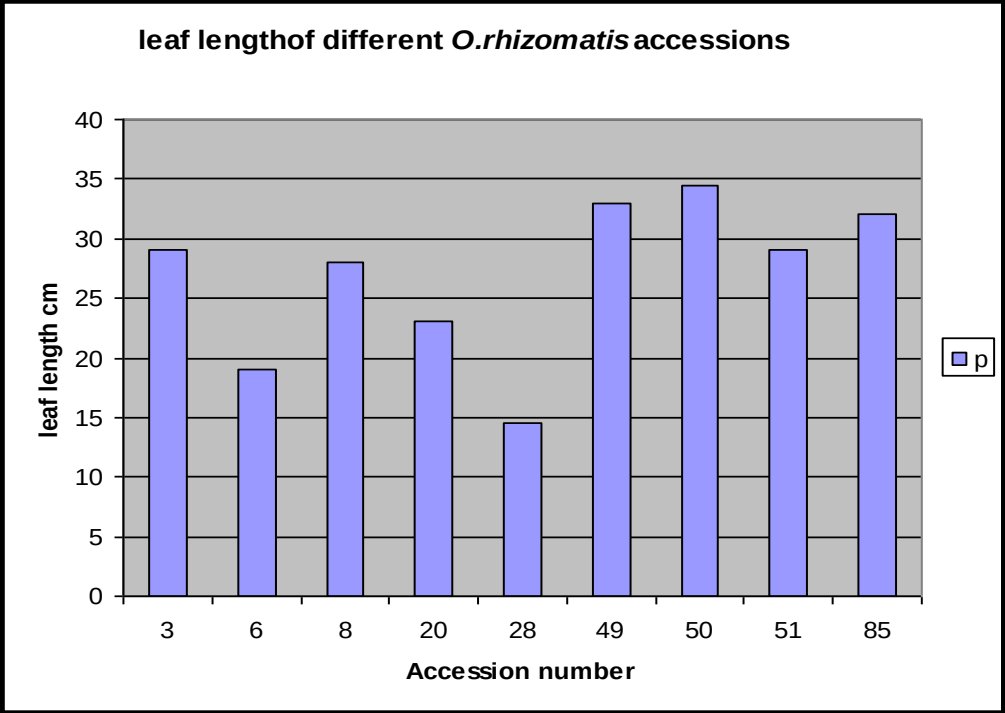
Leaf length of different *O.rufipogon* accessions



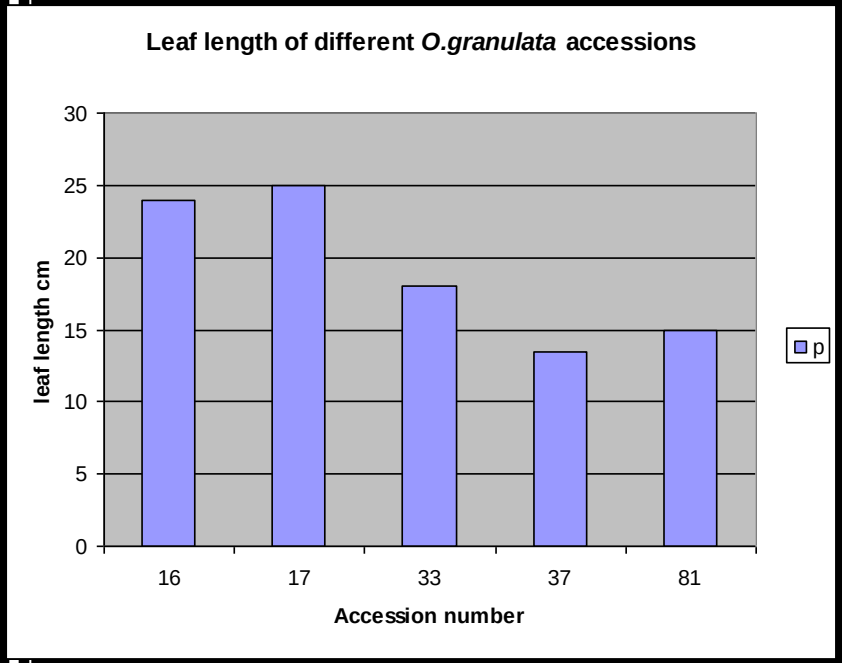
Leaf length of different *O.eichingeri* accessions



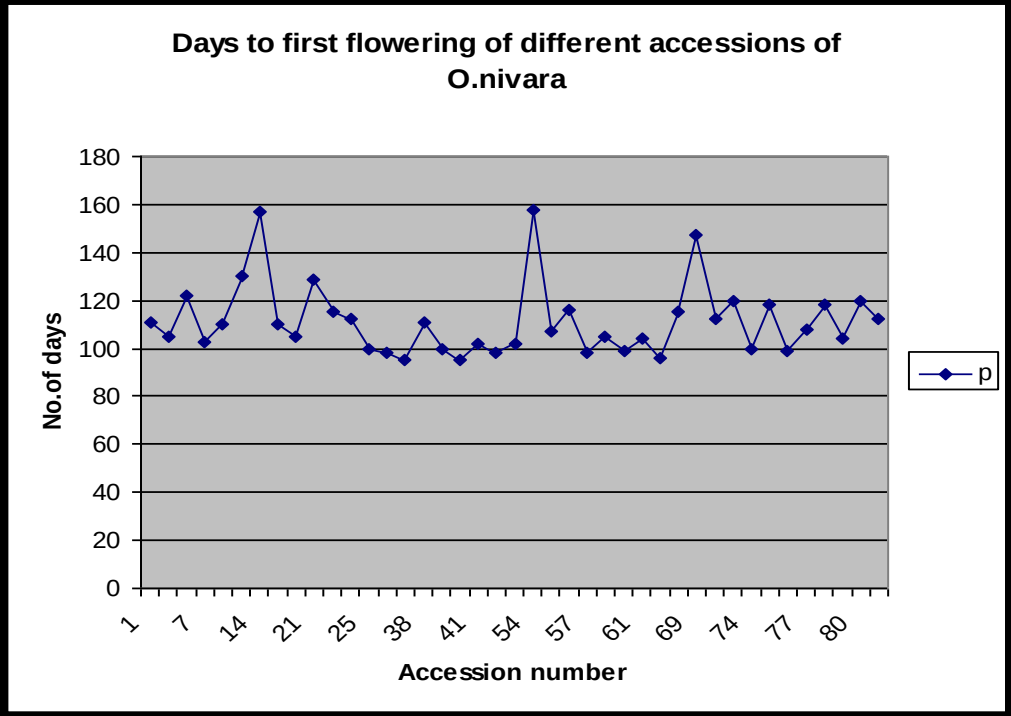
Leaf length of different *O.rhizomatis* accessions



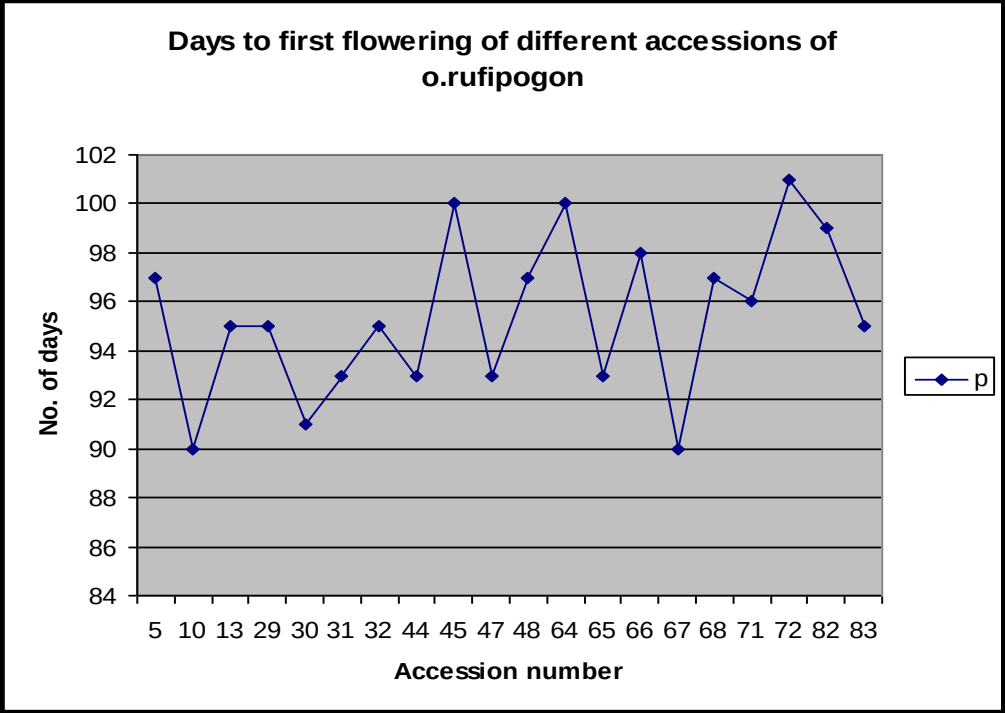
Leaf length of different *O.granulata* accessions



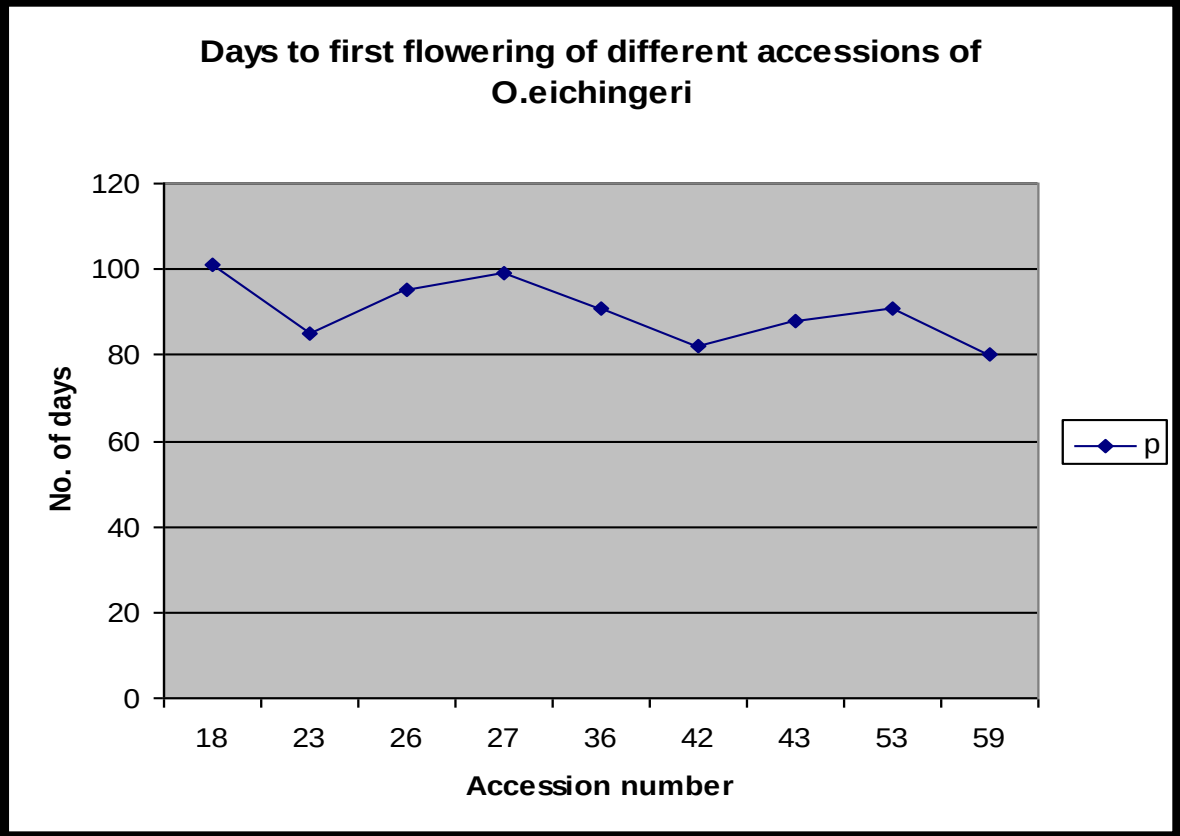
Days to first flowering of different accessions of *O.nivara*



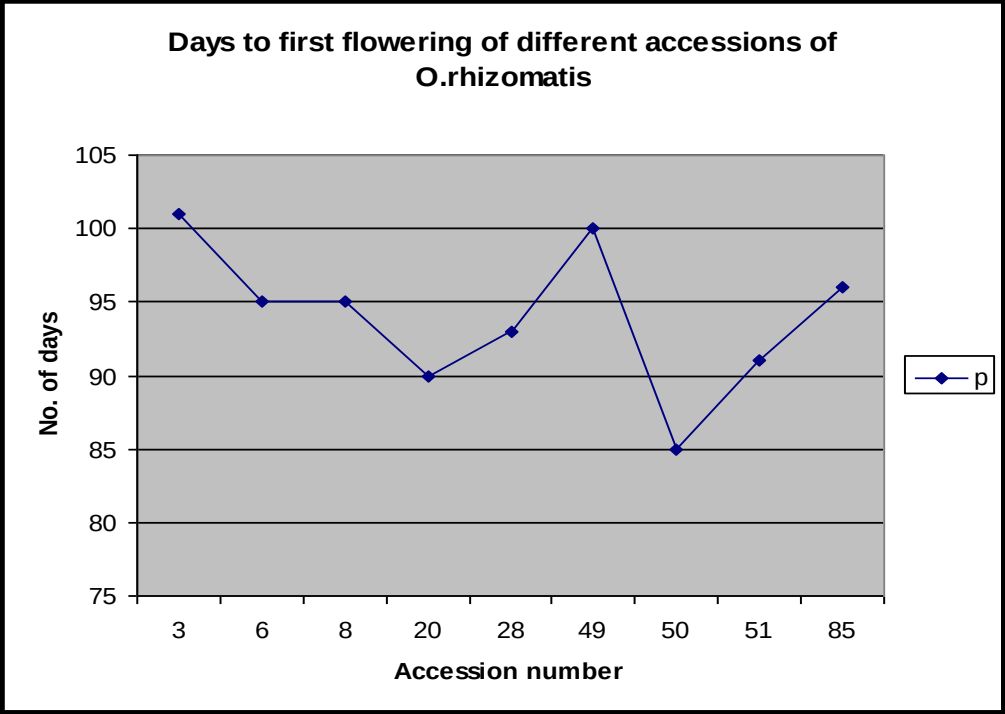
Days to first flowering of different accessions of *O.rufipogon*



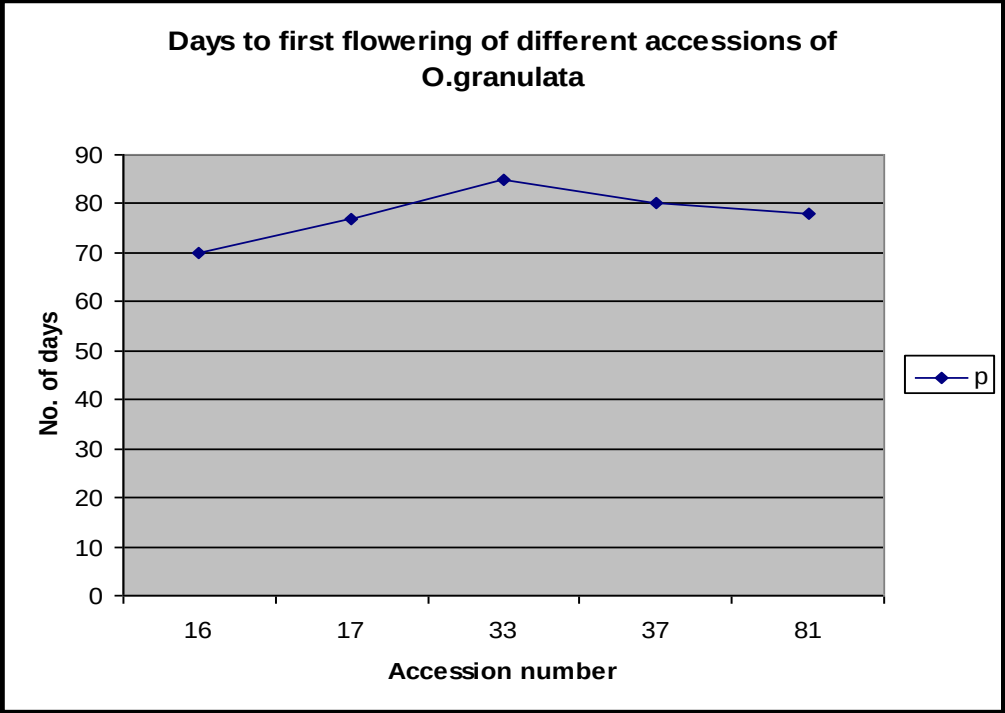
Days to first flowering of different accessions of *O.eichingeri*



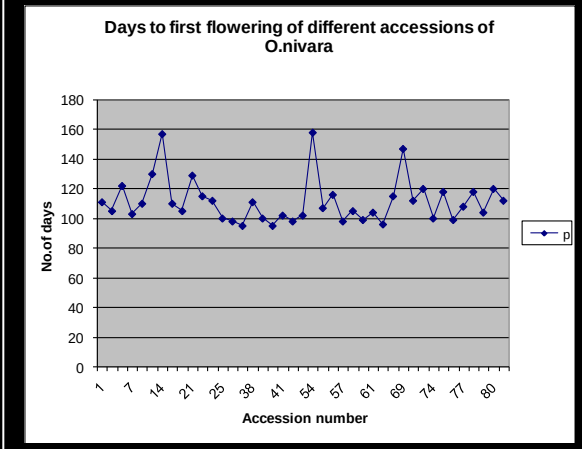
Days to first flowering of different accessions of *O.rhizomatis*

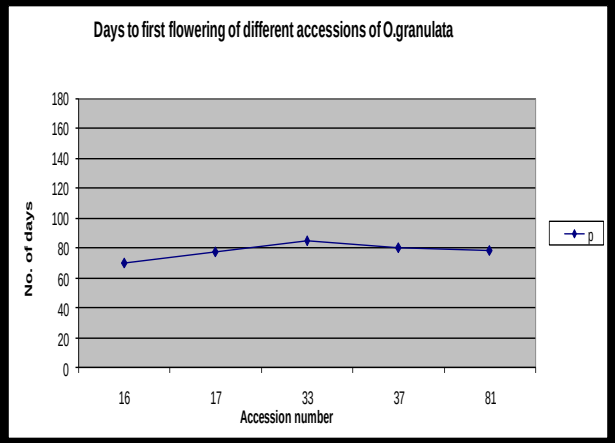


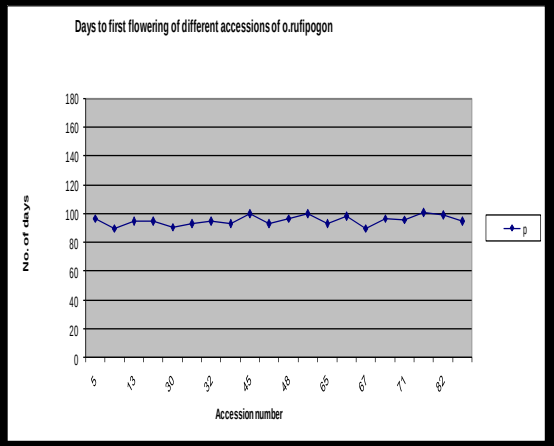
Days to first flowering of different accessions of *O.granulata*

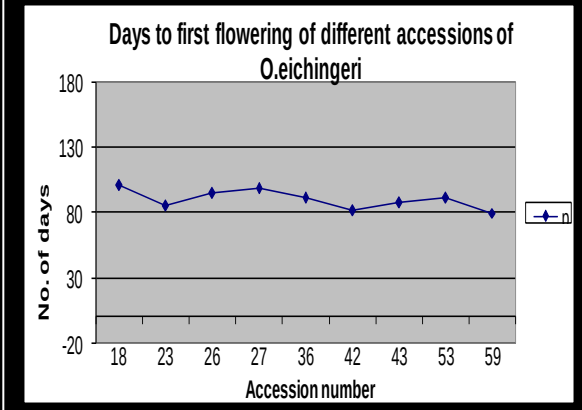


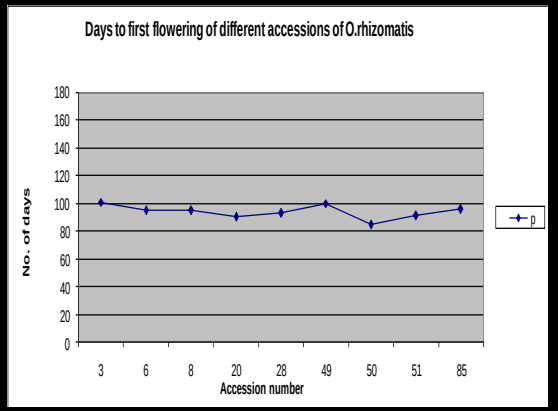
Comparison


Days to first flowering of different accessions of O.nivara
No.of days
Accession number
p

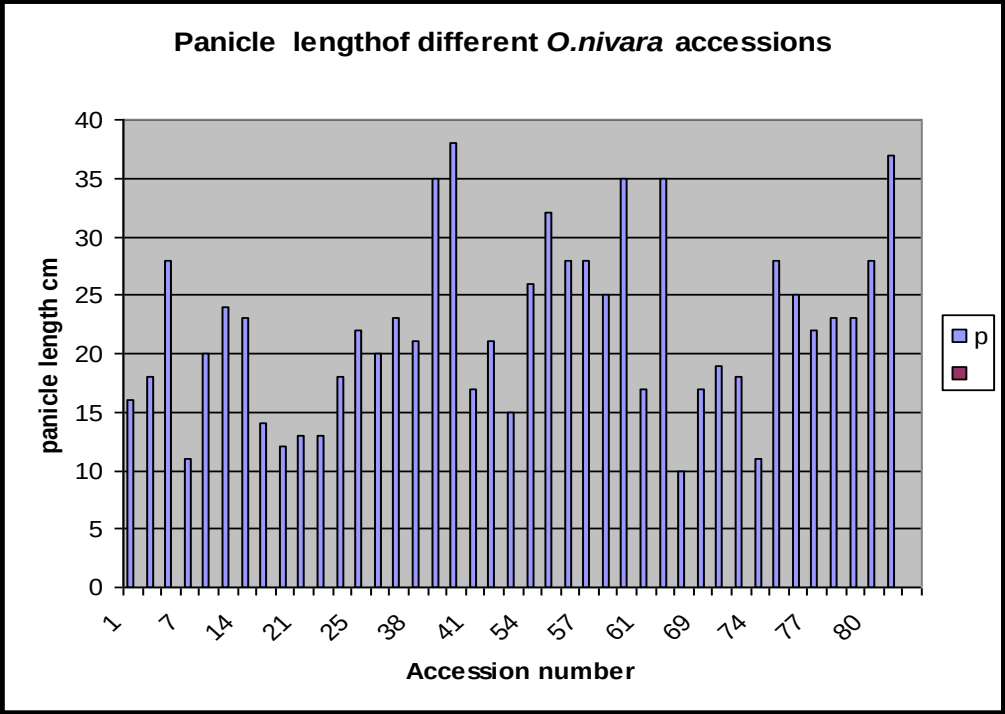

Days to first flowering of different accessions of O.granulata
No. of days
Accession number
p


Days to first flowering of different accessions of o.rufipogon
No. of days
Accession number
p

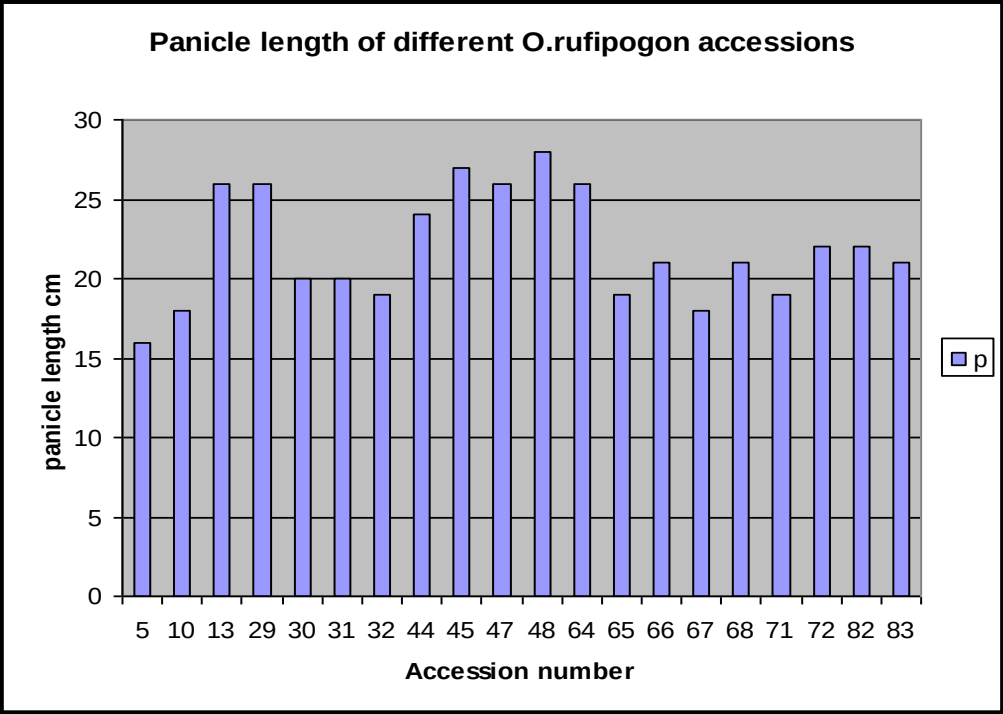

Days to first flowering of different accessions of O.eichingeri
No. of days
Accession number
p


Days to first flowering of different accessions of O.rhizomatis
No. of days
Accession number
p

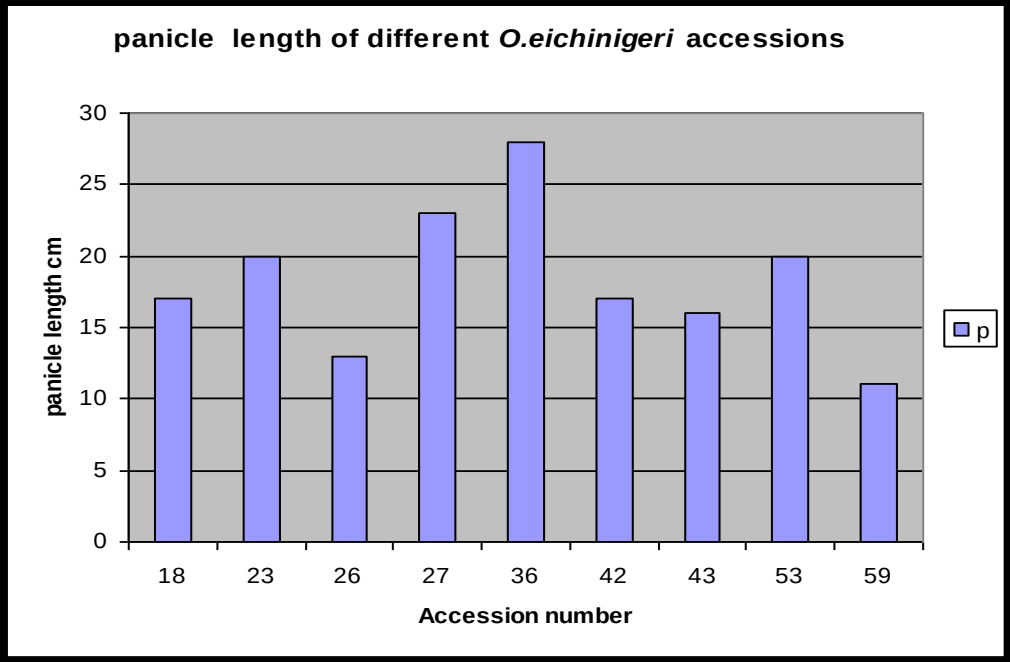
Panicle length of different *O.nivara* accessions



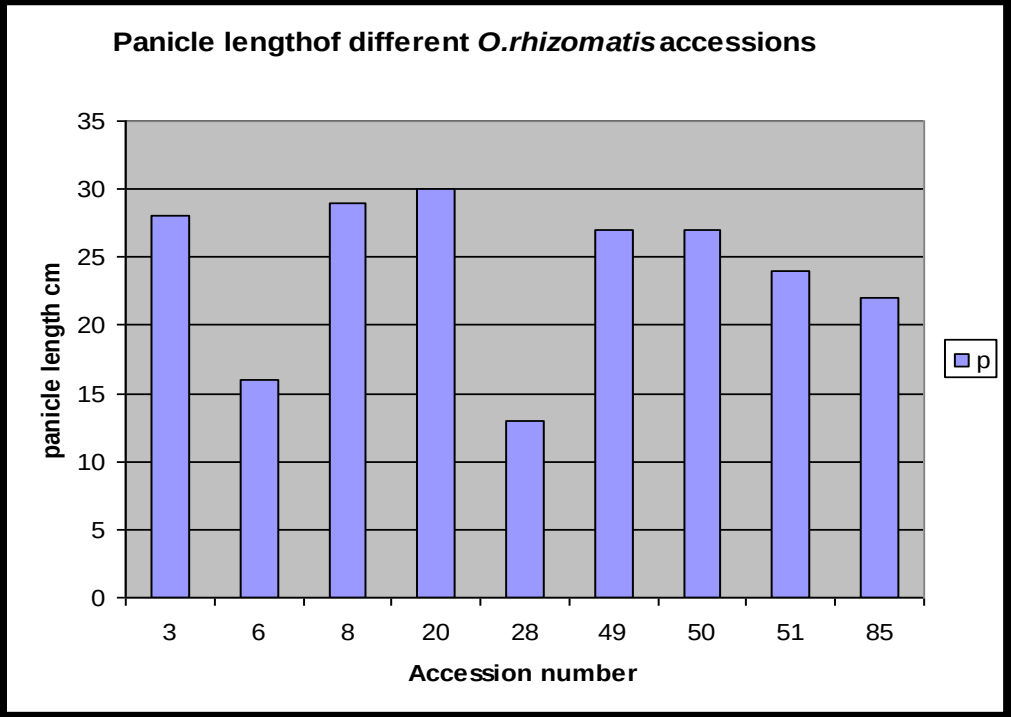
Panicle length of different *O.rufipogon* accessions



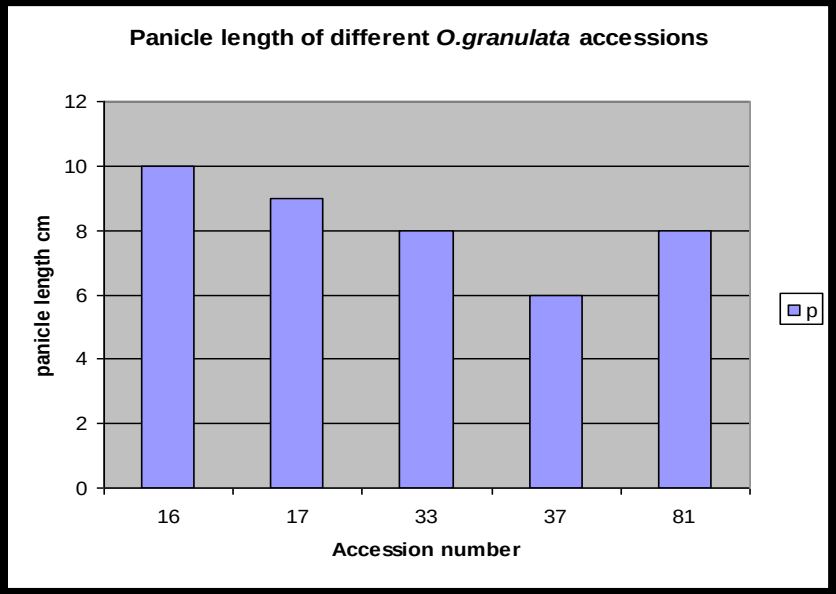
Panicle length of different *O.eichingeri* accessions



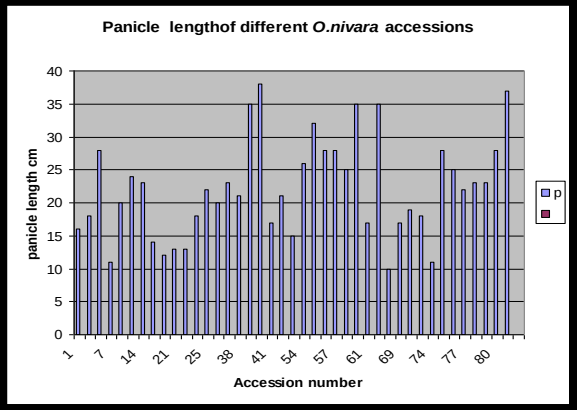
Panicle length of different *O.rhizomatis* accessions

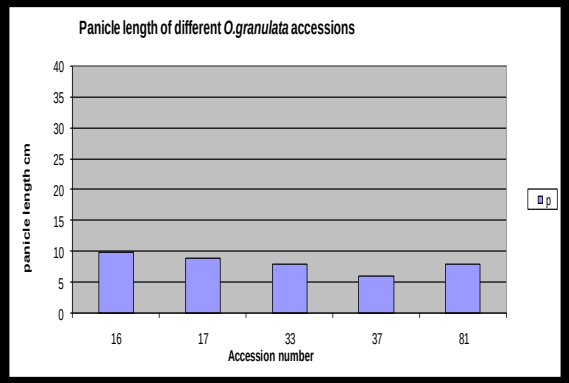


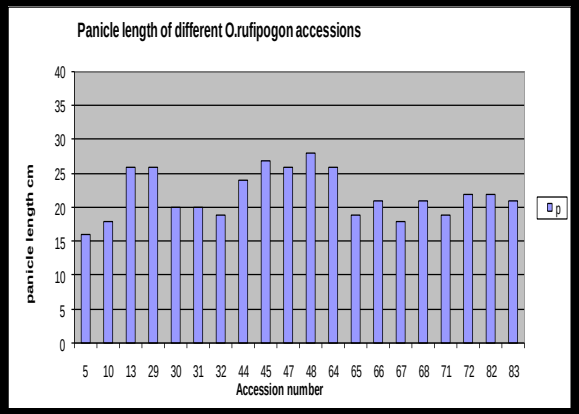
Panicle length of different *O.granulata* accessions

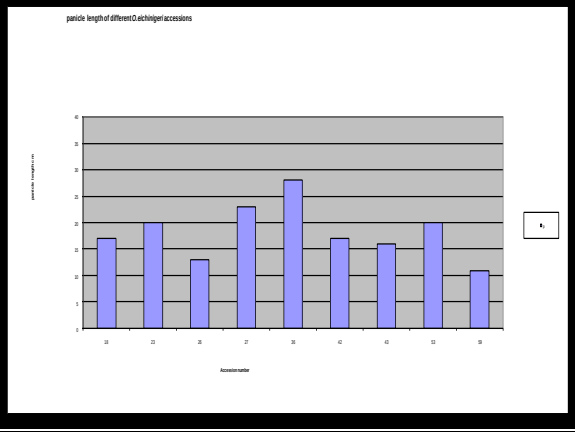


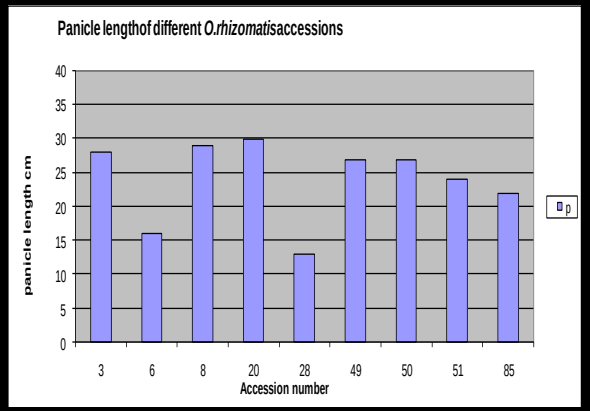
Comparison


Panicle lengthof different O.nivara accessions
panicle length cm
Accession number
p


Panicle length of different O.granulata accessions
panicle length cm
Accession number
p


Panicle length of different O.rufipogon accessions
panicle length cm
Accession number
p


panicle length of different O.eichingeri accessions


Panicle lengthof different O.rhizomatisaccessions
panicle length cm
Accession number
p

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 *O.granulata*
- *O.eichingeri*
- *O.rhizomatis*
- Intermediate bold *O.nivara*
- *O.rufipogon*

Results –published at SLAAS technical session

Publications related to project activities

Sri Lanka Association for the Advancement of Science
Proceedings of the 64th Annual Sessions – 2008, Part I - Abstracts

214/B

Collection of wild rice germplasm in Sri Lanka

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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.

Financial assistance by Crop Wild Relatives Conservation project is acknowledged.

Tel: 037-2259881

Conclusion

- These valuable resources can be use for crop improvement programme.

Acknoledgements

- Dr.D.M.N.Dissanayake, Director, Rice Research and Development Institute,Batalagoda, Ibbagamuwa.
- Other scientists and technical staff of RRDI
- Dr. Anura Wijesekara Coordinator, CWR project

Thank you