

# *Costularia* and *Eleocharis* (CYPERACEAE) of Madagascar

**Rondro RAMANANJANAHARY**  
**Coach: Dr Isabel Larridon**



# Why this study?

## TAXONOMIC PROBLEMS

- Many unidentified specimens at the two national herbaria.
- Lack of literatures to verify taxonomic problems of Madagascar's *Costularia* and *Eleocharis* = knowledge out of date.

***Taxonomic revision needed! Numerous undescribed species, complexes, etc.***

# Why this study?

## ECOLOGICAL AND SOCIO-ECONOMIC PROBLEMS

- Representatives of the two genera mainly grow in wetlands.
- Wetlands are subject to various anthropogenic pressures. Swamps are threatened by their backfilling and their transformation to rice fields.
- Unsustainable artisanal uses of *Eleocharis* spp.



# What are the goals?

Higher Taxa  
Orders  
Families  
Genera  
Species  
Plant Themes

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***Costularia* C.B. Clarke**    

**Published In:** Flora Capensis 7: 274. 1898. (Fl. Cap.) 

**Project Name Data** (Last Modified On 6/10/2009)  
**Acceptance :** Accepted

**Taxon Profile** (Last Modified On 7/18/2014)

**Reference(s):**

- Chermезon, H. 1937. Cyperacees. Fl. Madagasc. 29: 1-299. [BHL](#)
- Bruhl, J. J. 1995. Sedge genera of the world: Relationships and a new classification of the Cyperaceae. Aus
- Kükenthal, G. 1939. Vorarbeiten zu einer Monographie der Rhynchosporideae. XI. Repert. Spec. Nov. Regni V


**Generic Distribution:** Not Endemic to the Malagasy Region  
**Generic Species Diversity and Endemism Status:** has been evaluated  
**No. of species in Fl. Madagasc.:** 7 endemic  
**Accepted Published Species:** 8 (7 endemic, 1 indigenous non-endemic)  
**Estimated Undescribed Species:** 4 endemic  
**Estimated Total Species:** 12 (11 endemic, 1 indigenous non-endemic)  
**Additional Taxonomic Work:** in progress  
**Species Level Data Entry:** Complete

**Notes:** Clarke originally published the genus in 1895, but as a nomen nudum. It was only validated in 1898. Over and several authors have included the genus in *Tetraria*, but recent work (Bruhl, 1995; Bruhl and Verboom *pers.* the African and Malagasy spp) probably represents a coherent genus.

**Compiled or updated by:** N. Rakotonirina, R. Ramananjahary & P.B. Phillipson

- Review the case of *Costularia*
- Describe some *Costularia* sp.nov.
- Update data on Madagascar Catalogue

# What are the goals?



**Catalogue of the Vascular Plants of Madagascar**





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Madagascar > Poales > Cyperaceae > Eleocharis

**!Eleocharis R. Br.**    

**Published In:** Prodr. Fl. Novae Hollandiae 1: 224. 1810. (Prodr.) 

**Project Name Data** (Last Modified On 2/9/2011)  
**Acceptance :** Accepted

**Taxon Profile** (Last Modified On 7/30/2014)  
**Reference(s):**

- Chermeson, H. 1937. Cyperacees. Fl. Madagasc. 29: 1-299. 

**Generic Distribution:** Not Endemic to the Malagasy Region  
**Generic Species Diversity and Endemism Status:** has not yet been evaluated  
**No. of species in Fl. Madagasc.:** 13 (4 endemic, 9 indigenous non endemic)  
**Accepted Published Species:** 10 (3 endemic, 7 indigenous non endemic)  
**Estimated Undescribed Species:** not yet evaluated  
**Estimated Total Species:** not yet evaluated  
**Species Level Data Entry:** Complete

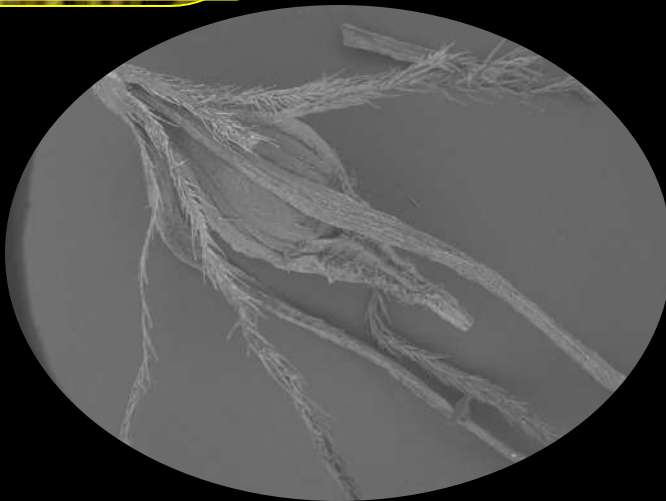
**Notes:** Published in Fl. Madagasc. as *Heleocharis* R. Br.

- Doing taxonomic evaluation of the genus *Eleocharis*
- Clarify some nomenclatural problems
- Update data on Madagascar Catalogue .

# How to recognize *Costularia*?



*Costularia* sp.



- Few flowered spikelets, numerous empty basal glumes.
- Glumes distinctly distichous, hypogynous bristles well developed.
- Stylobase strongly thickened, persisting on the achene, separate from the ovary by a real beak.

# How to recognize *Eleocharis*?



- Leaves reduced to sheaths without leaf blades.
- Unique spikelet, terminal, ordinarily multifloral.
- Glumes spirally placed, all fertile or the 2 lower empty.



*Eleocharis* sp.

# Work in progress

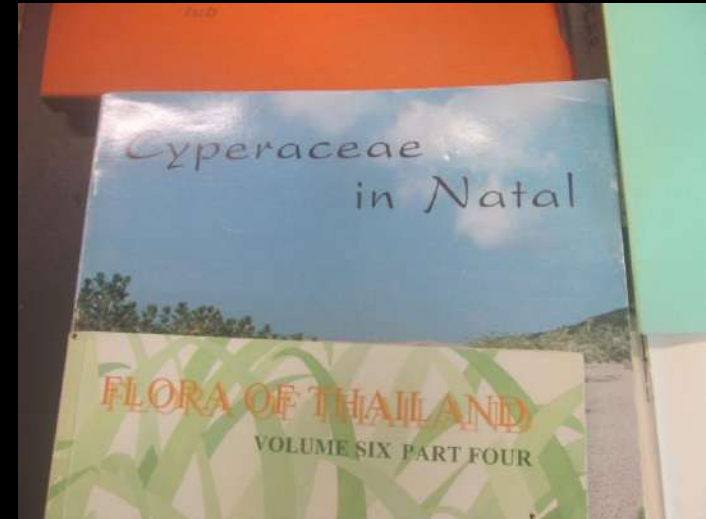


**Gather literature**

**Group specimens into morphospecies**

**Use data in biometrical analyses**

**Identify & update specimens**





# What was done at Gent?

- 1. Specimen loans from G, BR , P and GENT including types and other collections from Madagascar and elsewhere.**
- 2. Bibliography (gathering protologues, taxonomic literature, etc.)**
- 3. Taxonomic assessment (morphological study and morphometric analysis)**
- 4. Species identification + data captured and updated in Madcat**

# 1. Loans for Madagascar's specimens

Specimens	P	G	BR	GENT	TOTAL
<i>Costularia</i>	28	6	1	9/17	44/54
<i>Eleocharis</i>	0	0	3/194	24/114	27/308
TOTAL	28	6	4/194	33/131	71/362

**71/362 of the loaned specimens are from Madagascar**

# 1. Loans for Madagascar's specimens

<i>Especies</i>	Nb
<i>C. humbertii</i>	1
<i>C. laxa</i>	2
<i>C. leucocarpa</i>	5
<i>C. melleri</i>	1
<i>C. microcarpa</i>	1
<i>C. pantopoda</i>	14
<i>C. purpurea</i>	3
<i>C. sp1</i>	6
<i>C. sp2</i>	4
<i>C. sp3</i>	2
<i>C. sp4</i>	3
<i>C. sp</i>	2
<b>TOTAL</b>	<b>44/54</b>

<i>Especies</i>	Nb
<i>E. acutangula</i>	2
<i>E. atropurpurea</i>	1
<i>E. caduca</i>	4
<i>E. caespitosissima</i>	8
<i>E. dulcis</i>	2
<i>E. minuta</i>	2
<i>E. nigrescens</i>	1
<i>E. spiralis</i>	2
<i>E. variegata</i>	3
<i>E. sp</i>	2
<b>TOTAL</b>	<b>27/308</b>

## 2. Bibliography

❖ Madagascar's *Costularia* species are included in the subgenus *Costularia* and all *Costularia* present in Madagascar are endemics

❖ The number of Madagascar's *Eleocharis* species is reduced to 11, all of them are not endemic.



### 3. Taxonomic assessment

❖ morphological study: qualitative and quantitative characters



❖ morphometric analysis: use of PCA and ANOVA

# 4. Species identification + data captured/updated in Madcat




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Web Sites

Madagascar > Poales > Cyperaceae > Costularia


**Costularia C.B. Clarke**     

Published In: Flora Capensis 7: 274. 1898. (Fl. Cap.) 

**Project Name Data**  (Last Modified By User, System On 6/10/2009)  
**Acceptance** : Accepted

**Taxon Profile**  (Last Modified By Ramananjahary, Rondro On 8/27/2014)  
**Family indexing name**: Cyperaceae

**Reference(s)**:

- Chermezon, H. 1937. Cyperacees. Fl. Madagasc. 29: 1-299. 
- Bruhl, J. J. 1995. Sedge genera of the world: Relationships and a new classification.
- Kükenthal, G. 1939. Vorarbeiten zu einer Monographie der Rhynchosporideae. XI.

**Generic Distribution**: Not Endemic to the Malagasy Region  
**Generic Species Diversity and Endemism Status**: has been evaluated  
**No. of species in Fl. Madagasc.:** 7 endemic  
**No. of species in Fl. Madagasc. - Endemic:** 7  
**No. of species in Fl. Madagasc. - Non-Endemic:** 0  
**No. of species in Fl. Madagasc. - Naturalised:** 0  
**Accepted Published Species:** 8 endemic  
**Accepted Published Species - Endemic:** 8  
**Accepted Published Species - Non-Endemic:** 0  
**Accepted Published Species - Naturalised:** 0  
**Estimated Undescribed Species:** 4 endemic  
**Estimated Undescribed Species - Endemic:** 4  
**Estimated Undescribed Species - Non-Endemic:** 0  
**Estimated Undescribed Species - Naturalised:** 0  
**Estimated Total Species:** 12 endemic  
**Estimated Total Species - Endemic:** 12  
**Estimated Total Species - Non-Endemic:** 0  
**Estimated Total Species - Naturalised:** 0  
**Additional Taxonomic Work**: in progress  
**Species Level Data Entry**: Complete

**Notes**: Clarke originally published the genus in 1895, but as a nomen nudum. It was widely, and several authors have included the genus in *Tetraria*, but recent work (Bruhl sense (based on the African and Malagasy spp) probably represents a coherent genus






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Madagascar > Poales > Cyperaceae > Eleocharis


**!Eleocharis R. Br.**     

Published In: Prodromus Florae Novae Hollandiae 1: 224. 1810. (Prodr.) 

**Project Name Data**  (Last Modified By Phillipson, Peter On 2/9/2011)  
**Acceptance** : Accepted

**Taxon Profile**  (Last Modified By Ramananjahary, Rondro On 8/27/2014)  
**Family indexing name**: Cyperaceae

**Reference(s)**:

- Chermezon, H. 1937. Cyperacees. Fl. Madagasc. 29: 1-299. 

**Generic Distribution**: Not Endemic to the Malagasy Region  
**Generic Species Diversity and Endemism Status**: has not yet been evaluated  
**No. of species in Fl. Madagasc.:** 13 (4 endemic, 9 indigenous non endemic)  
**No. of species in Fl. Madagasc. - Endemic:** 4  
**No. of species in Fl. Madagasc. - Non-Endemic:** 9  
**Accepted Published Species:** 11 indigenous non endemic  
**Accepted Published Species - Endemic:** 0  
**Accepted Published Species - Non-Endemic:** 11  
**Accepted Published Species - Naturalised:** 0  
**Estimated Undescribed Species:** not yet evaluated  
**Estimated Total Species:** not yet evaluated  
**Species Level Data Entry**: Complete

**Notes**: Published in Fl. Madagasc. as *Heleocharis* R. Br.  
**Contributors**: Rakotonirina, Nivothenintsoa, Ramananjahary, Rondro Hanitrinitiana  
**Legacy Last Modified**: mada.pbp-23:35:47 19 May 2004

# Costularia Madagascar species



*C. brevifolia*



*C. humbertii*



*C. laxa*



*C. leucocarpa*



*C. pantopoda*



*C. melleri*

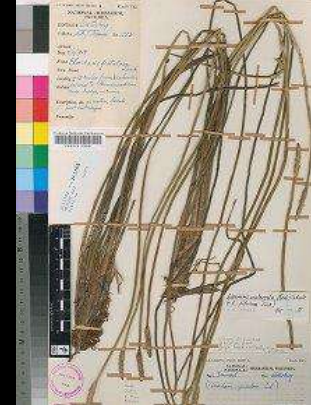


*C. microcarpa*



*C. purpurea*

# Eleocharis Madagascar species



*E. acutangula*



*E. atropurpurea*



*E. caduca*



*E. caespitosissima*



*E. dulcis*



*E. geniculata*



*E. limosa*



*E. minuta*



*E. nigrescens*



*E. spiralis*



*E. variegata*



# Expected results

- Taxonomic frame of the two genera updated
- Publication in international journal and on-line results
- Possibility of extending the morphological study into molecular research.
- Ability to master Cyperaceae group (the two genera) after the training.

# **ACKNOWLEDGEMENT**

- **Herbaria curators : P, TAN, TEF, G, BR & GENT**
- **Staff of Institut Royal des Sciences naturelles de Belgique, GTI & CDB: Dr Marie-Lucie Susini & al.**
- **MBG Staff: Madagascar, Genève, Paris and St Louis**
- **Gent University Staff: Dr Isabel Larridon, Dr Kenneth Bauters, Prof Paul Goetghebeur & al.**

*Thank you for listening*

*DANK U*



Convention on  
Biological Diversity