

OVERVIEW OF THE FLORA OF ETHIOPIA AND ERITREA: THE LONG ROAD TO A COMPLETION

Sebsebe Demissew¹

ABSTRACT: Prior to the initiation of the Ethiopian Flora Project (EFP), there were a number of attempts over the years to write the flora for a particular region/s or areas of Ethiopia and Eritrea. The modern Ethiopian Flora Project was initiated in 1980 as a bilateral agreement between the Ethiopian and Swedish governments through the then Ethiopian Science and Technology Commission (ESTC) (now the Ministry of Science and Technology) and the Swedish Agency for Research Cooperation with Developing Countries (SAREC) (now Sida-SAREC). The project was carried out with shared responsibilities between Addis Ababa University and Uppsala University, Sweden. The objectives of the project were: 1) to write up a Flora of Ethiopia (FE), which later became the Flora of Ethiopia and Eritrea (FEE) with the separation of Eritrea from Ethiopia in 1991; 2) build-up of the National Herbarium and a related library; and 3) promotion of scientific activities in other fields of botany. By the end of the project in 2009, the writing of the FEE was completed with the publication of 8 volumes in 10 books including information on the description, ecology and distribution of 6,027 vascular plants taxa. Of these taxa, 10% are endemic to Ethiopia and Eritrea (Ensermu Kelbessa and Sebsebe Demissew, 2014 in this volume). Due to this project, the number of plant specimen in the Herbarium grew from 14,000 in 1980 to 80,000 at present. The project has also trained 11 Ethiopian nationals at PhD level, who later become the nucleus for the advancement of Botanical Sciences in Ethiopia. The early conception of the complementary value of a Botanical Garden to the National Herbarium for research and education by these young academicians led to the initiation of its establishment. They had worked tirelessly over the years. This effort finally led to the establishment of the Gulelle Botanic Gardens on the outskirts of Addis Ababa in 2005 in collaboration with the Addis Ababa City Administration.

Key words/phrases: Botany, Ethiopian Flora Project, Gulelle Botanical Garden, National Herbarium.

1. INTRODUCTION

This article is aimed at providing an overview of the Ethiopian Flora Project, which is a continuation of the paper presented at a workshop organized by the Department of Organismal Biology, Evolutionary Biology

¹ Keeper, The National Herbarium (ETH) and Leader, Ethiopian Flora Project (1996-2009), Department of Plant Biology and Biodiversity Management, College of Natural Sciences, Addis Ababa University, P.O. Box 3434, Addis Ababa, Ethiopia. E-mail: sebsebe.demissew@aau.edu.et; sebseb.demissew@gmail.com

Centre, Uppsala University, Sweden, as a finalization of the Ethiopian Flora Project (Sebsebe Demissew, 2011). Some parts from the previous paper are also modified and included to provide more information to local audiences who may not have access to the previous publication. Thus, this paper summarizes the previous attempts for documenting the Flora of Ethiopia, the inception of modern Flora of Ethiopia, the objectives and accomplishments of the EFP and the conception and evolution of the Gulelle Botanic Garden.

1.1. Previous attempts to write the Flora of Ethiopia

Prior to the initiation of the Ethiopian Flora Project (which later became the Flora of Ethiopia and Eritrea) in 1980, there were at least three attempts over many years to write the Flora of Ethiopia and Eritrea.

Achille Richard (1794-1852)

The first attempt was made by the French botanist (Fig. 1), Achille Richard (1794-1852). He had compiled “*Tentamen Florae Abyssinicae*” (An attempt to the Flora of Abyssinia), in two volumes (Richard, 1847-1851). These volumes were mainly based on the plant specimens collected by a number of early travellers in various periods in Ethiopia, mainly the northern part. The prominent ones include the Scottish, James Bruce between 1768-1773; the British Henry Salt between 1804-1806 and 1809-1810; the German naturalist, W.P. Edward Rüppel between 1832-1833; the second German, who resided in Ethiopia, Wilhem George Schimper between 1837 until his death in 1878; two French naturalists Quartin-Dillon (1838-1840) and Antoine Petit (1838-1843). The two volumes by A. Richard contained 1700 species/taxa in 655 genera and 119 Families. These two volumes were later republished by Uppsala University in 1982.

Georg Cufodontis (1896-1974)

The second attempt was by Georg Cufodontis (1896-1974) (Fig. 2) based in Vienna, Austria. He worked on the checklist and literature review of the Flora of Ethiopia and published as “*Enumeratio Plantarum Aethiopiae Spermatophyta*” (the enumeration of the Seed Plants of Ethiopia) in two volumes. The enumeration included the Flora of Eritrea, Ethiopia, Djibouti and Somalia) that appeared in facsimile between 1953-1972. However, the whole work was compiled and published by the Bulletin du Jardin Botanique National de Belgique in two parts in 1974. Part 1 consisted of i-xvii + pages 1-827 and part II consisted of pages 828-1657. This work has contributed tremendously to the production of the Flora of Ethiopia and

Eritrea. The enumeration included 6323 species in 1401 genera and 179 Families.

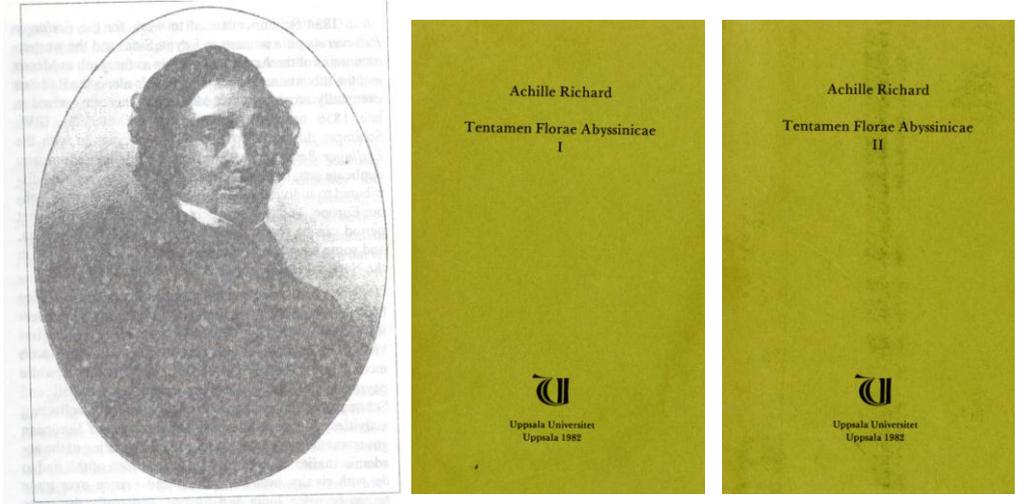


Fig. 1. Photo of Achille Richard (Courtesy of Bergius Foundation, Stockholm) and Volume 1 & 2 of his publications.

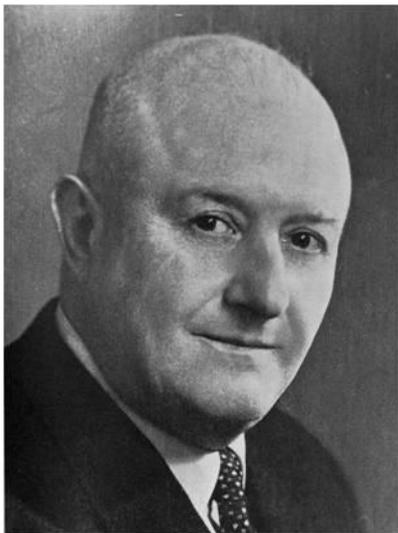


Fig. 2. Photo of Georg Cufodontis (Courtesy of Erbario Tropicale, Firenze) and his publications Enumeratio Plantarum Aethiopiae (1953-1972).

Pichi-Sermolli (1912-2005)

An Italian botanist, Pichi-Sermolli (1912-2005) (Fig. 3) initiated the third attempt to write the Flora of Ethiopia and Eritrea as “Adumbratio Florae Aethiopicae” between 1953-1978 and published the families with descriptions in the journal *Webbia* (Table 1).

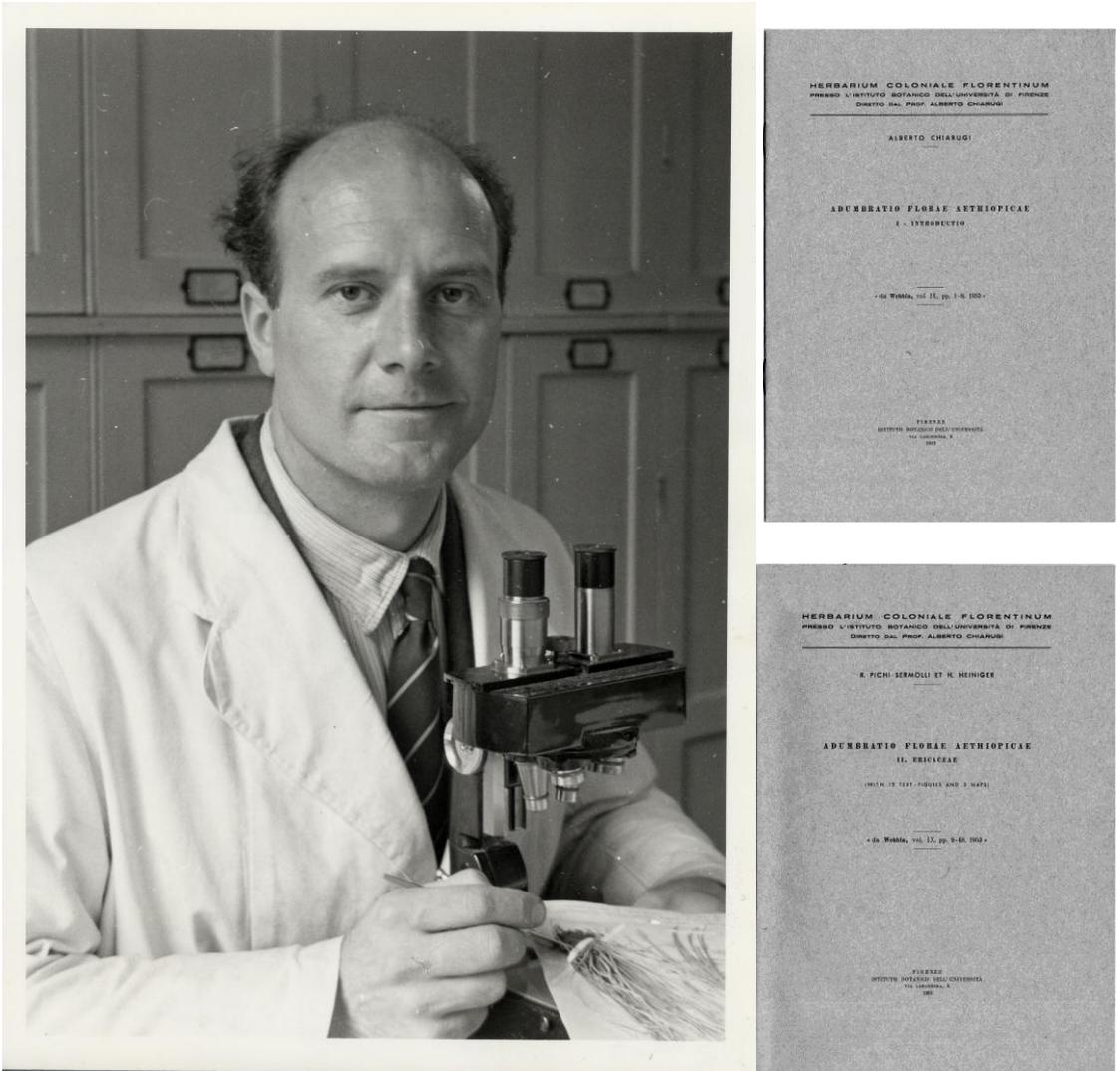


Fig. 3. Photo of Pichi-Sermolli (Courtesy of Erbario Tropicale, Firenze) and publications of *Adumbratio Florae Aethiopicae*: 1953-1978.

Table 1. Publications in *Webbia* on families occurring in Ethiopia and Eritrea.

Year of publication	Reference in <i>Webbia</i>	Family	Author/s
1953	<i>Webbia</i> 9: 1-8	Introduction	A. Chiaguri
1953	<i>Webbia</i> 9: 9-48	Ericaceae	R.E.G. Pichi-Sermolli & H. Heiniger
1954	<i>Webbia</i> 9: 623-660	Ophiglossaceae, Osmundaceae, Schizaeaceae	R.E.G. Pichi-Sermolli
1955	<i>Webbia</i> 12: 121-146	Hymenophyllaceae, Negripteridaceae, Cyatheaceae	R.E.G. Pichi-Sermolli
1957	<i>Webbia</i> 12: 645-704	Parkeriaceae, Adiantaceae, Vittariaceae	R.E.G. Pichi-Sermolli
1957	<i>Webbia</i> 13: 133-228	Caesalpiniaceae (excl. gen. <i>Cassia</i>)	G. Roti-Michelozzi
1958	<i>Webbia</i> 14: 161-211	Cruciferae (Trib. Lepidieae, Eclidieae, Sisymbrieae)	G. Franchetti
1962	<i>Webbia</i> 17: 33-43	Gleicheniaceae	R.E.G. Pichi-Sermolli
1963	<i>Webbia</i> 17: 299-315	Cryptogrammeaceae	R.E.G. Pichi-Sermolli
1963	<i>Webbia</i> 17: 317-328	Actiniopteridaceae	R.E.G. Pichi-Sermolli
1965	<i>Webbia</i> 20: 745-769	Oleandraceae	R.E.G. Pichi-Sermolli
1965	<i>Webbia</i> 20: 771-778	Buxaceae	G. Serato Valenti
1966	<i>Webbia</i> 21: 487-505	Hemionitidaceae	R.E.G. Pichi-Sermolli
1967	<i>Webbia</i> 22: 233-289	Hypericaceae	G. Moggi & A. Pisacchi
1968	<i>Webbia</i> 23: 209-246	Elaphoglossaceae	R.E.G. Pichi-Sermolli
1969	<i>Webbia</i> 23: 329-351	Marattiaceae	R.E.G. Pichi-Sermolli
1969	<i>Webbia</i> 23: 353-378	Turneriaceae	G. Roti Michelozzi Clavario
1969	<i>Webbia</i> 23: 379-396	Lomariopsidaceae	R.E.G. Pichi-Sermolli
1969	<i>Webbia</i> 24: 337-389	Thymelaeaceae	P. Gastaldo
1970	<i>Webbia</i> 24: 619-634	Globulariaceae	G. Bragglo Morucchio
1970	<i>Webbia</i> 24: 635-698	Primulaceae	M.P. Bizzarri
1971	<i>Webbia</i> 26: 1-99	Caesalpinaceae (gen. <i>Cassia</i>)	G. Serrato Valenti
1972	<i>Webbia</i> 27: 467-504	Onagraceae	M.P. Bizzarri & P.H. Raven
1973	<i>Webbia</i> 28: 135-159	Rhizophoraceae	M.R. Arena & F. Orsino
1973	<i>Webbia</i> 28: 521-542	Saxifragaceae	A. Rampi
1974	<i>Webbia</i> 29: 17-80	Menispermaceae	E. Benvenuto
1975	<i>Webbia</i> 29: 545-593	Selaginellaceae	M.P. Bizzarri
1976	<i>Webbia</i> 30: 177-190	Olacaceae	R.A. Defillips
1978	<i>Webbia</i> 32: 417-453	Oxalidaceae	G.R.M. Clavario
1978	<i>Webbia</i> 33: 45-101	Zygophyllaceae	N.M. El Hadidi
1978	<i>Webbia</i> 33: 103-113	Equisetaceae	P.G. Gastaldo
1978	<i>Webbia</i> 33: 115-135	Nephrolepidaceae	R.E.G. Pichi-Sermolli

2. THE MODERN FLORA OF ETHIOPIA

Information on the documentation of the modern Flora of Ethiopia was compiled from Hedberg and Tewolde-Berhan Gebre-Egziabher (1989); Hedberg (1990; 1996; 2001; 2009; 2011); Tewolde-Berhan Gebre-Egziabher (1991); Sebsebe Demissew (2006; 2011).

Attempts to write the modern Flora of Ethiopia

Preliminary discussions about the writing of the Flora of Ethiopia involving botanists in Genoa, Wageningen and Uppsala Universities led to the presentation of the matter at the seventh plenary meeting of the Association pour l'etude taxonomique de la flore d'Afrique tropicale (AETFAT) that was held in Munich in 1970.

Following this, an Ethiopian *ad-hoc* committee was then established to study the proposal and modify it to safeguard Ethiopia's interests and solicit its acceptance by the Ethiopian Government.

This *ad-hoc* committee consisted of: Zemedede Worku, Seme Debela, and Sue Edwards from Institute of Agricultural Research (IAR); Tadesse Ebba from the Plant Genetic Resource Centre for Ethiopia (PGRCE); Lemma Gebre Selassie from the State Forest Development Agency; Taye Bezuneh and Amare Getahun from Alemaya College of Agriculture; Tewolde-Berhan Gebre-Egziabher, Getachew Aweke, Mesfin Tadesse and M.G. Gilbert from the Faculty of Science, Addis Ababa University.

Through a series of meetings, the *ad-hoc* committee worked out the detailed modifications it felt were necessary to finalize the proposal in line with Ethiopia's development objectives and a final project proposal was then written. A decision was also made that the Project was to be housed in the Faculty of Science, Addis Ababa University.

On the Ethiopian side, the project had obtained support from both the Addis Ababa University and the then Ethiopian Science and Technology Commission (now the Ministry of Science and Technology) and led by Dr. Tewolde-Berhan Gebre-Egziabher (Fig. 4). Funding for the Project was sought from the Swedish Agency for Research Cooperation with Developing Countries (SAREC) now Sida-SAREC with the assistance of Professor Olov Hedberg and Dr. Inga Hedberg (Fig. 4). These were the main "architects" of the modern Ethiopian Flora Project.

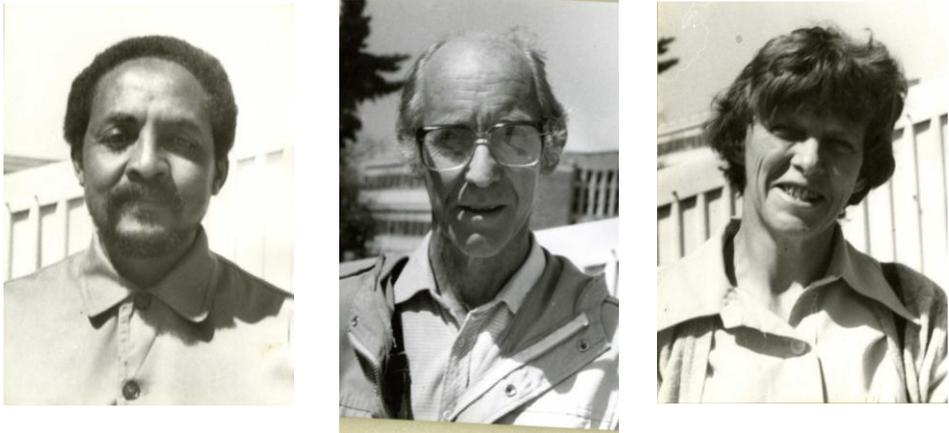


Fig. 4. Tewolde-Berhan Gebre-Egziabher (left), Olov Hedberg (middle) and Inga Hedberg (right).

Leadership of the Flora Project

The overall leadership of the Ethiopian Flora Project was based at the National Herbarium of Ethiopia (ETH) based at the College of Natural Sciences, Addis Ababa University. However, for the smooth running of the project, a leadership responsibility was shared between Addis Ababa, Ethiopia and Uppsala, Sweden.

EFP leadership at the National Herbarium (ETH)

During the life time of the project (1980-2009), there were three project leaders and they were assisted by other members of the National Herbarium of Ethiopia.

Tewolde-Berhan Gebre-Egziabher became the first project leader and coordinated activities on the Ethiopian side with the assistance from Dr. Mesfin Taddese and Ms. Sue Edwards until 1994. Dr. Mesfin Tadesse served as a second project leader from 1994 to 1996, who was assisted by Prof. Ensermu Kelbessa, Prof. Sebsebe Demissew, and Ms. Sue Edwards. The third project leader was Prof. Sebsebe Demissew who had served until the completion of the project (1996-2009). He was assisted by Prof. Ensermu Kelbessa, Ms. Sue Edwards, Prof. Sileshi Nemomissa and Dr. Zemedu Asfaw (Fig. 5).

On the Swedish side, Prof. Olov Hedberg was the project co-leader from 1980-2007 and was assisted by Dr. Inga Hedberg. O. Hedberg was deceased and Dr. Inga Hedberg took all the responsibility from 2007-2009.



Fig. 5. Leadership of the EFP: Ethiopian side – Tewolde-Berhan Gebre-Egziabher, Mesfin Tadesse, Sebsebe Demissew (from left to right top row), Ensermu Kelbessa, Sue Edwards, Sileshi Nemomissa (from left to right middle row); and Zemed Asfaw (from left to right bottom row); Swedish side – Prof. Olov and Inga Hedberg (from left to right bottom row).

2. Objectives of the Ethiopian Flora Project

1. Write up a Flora of Ethiopia within the shortest time possible, this being the principal objective of the project;

2. Build-up a National Herbarium and a related library to be used as reference centres for pharmacognosists, agriculturists, foresters, wildlife specialists, etc.; and

3. Promote scientific activities in taxonomic botany, economic botany, forestry, plant ecology, plant physiology, etc. through training.

2.1. Objective 1. Write up a Flora of Ethiopia within the shortest time possible

During the project proposal this objective was initially “indicated” to be completed in about 15-20 years after the start of the project in 1980. However, the completion of the Flora had taken about 29 years between 1980 (since the initiation of the Flora Project) and 2009. But it is about 20 years since the publication of the first volume (Vol. 3 of the Flora of Ethiopia), in 1989. The writing of the FEE was completed with the publication of 8 volumes in ten books. There are 243 vascular plant Families with 6,027 species (including subspecies) with 10% endemism (Refer to details by Ensermu Kelbessa and Sebsebe Demissew, 2014 in this volume).

Editorial Board

The Editorial board consisted of the following (Fig. 6).



Fig. 6. Members of the Editorial Board: Upper row – Ethiopian representatives (left to right): Tewolde-Berhan Gebre-Egziabher, Mesfin Tadesse (Alternate member), Sebsebe Demissew, Ensermu Kelbessa (alternate member), Sue Edwards. Lower row – European representatives (left to right): Olov Hedberg, Inga Hedberg and Ib Friis.

Editors of the published volumes of the Flora of Ethiopia and Eritrea

The main editors of the Flora of Ethiopia and Eritrea were: Inga Hedberg (Uppsala) and Sue Edwards (Ethiopia). However, they were assisted by the following co-editors based in Ethiopia, Uppsala and Denmark (Table 2 and Fig. 7).

Table 2. Editors and co-editors of the Flora of Ethiopia and Eritrea.

Volume	Families covered	Year of Publication	Editors and co-editors
Vol. 3	Pittosporaceae-Araliaceae	1989	I. Hedberg** & S. Edwards*
Vol. 7	Poaceae	1995	I. Hedberg** & S. Edwards*
Vol. 2:2	Canellaceae-Euphorbiaceae	1995	S. Edwards*, Mesfin Tadesse* & I. Hedberg**
Vol. 6	Hydrocharitaceae-Arecaceae	1997	S. Edwards*, Sebsebe Demissew* & I. Hedberg**
Vol. 2:1	Magnoliaceae-Flacourtiaceae	2000	S. Edwards*, Mesfin Tadesse*, Sebsebe Demissew* & I. Hedberg**
Vol. 4:1	Apiaceae-Dipsacaceae	2003	I. Hedberg**, S. Edwards* & Sileshi Nemomissa*
Vol. 4:2	Asteraceae	2004	I. Hedberg**, I. Friis** & S. Edwards*
Vol. 5	Gentianaceae-Cyclocheilaceae	2006	I. Hedberg**, Ensermu Kelbessa*, S. Edwards*, Sebsebe Demissew* & E. Persson**
Vol. 1	Lycopodiaceae-Pinaceae	2009	I. Hedberg**, I. Friis** & E. Persson**
Vol. 8	General part and Index	2009	I. Hedberg**, I. Friis** & E. Persson**

*: Editors based in Ethiopia; ** = Uppsala and/or Denmark

Collaboration in the writing up of the Flora Project

The writing up of the Flora Project and international collaborations

The writing of the Flora of Ethiopia and Eritrea was an international collaborative effort, with the participation of 90 botanists from over 17 countries in Africa, Europe, USA and Australia (Figs. 8 and 9). It is one of the few completed Flora of a country in Africa with full participation and engagement of local expertise and published in the country.



Fig. 7. Published volumes of the Flora of Ethiopia and Eritrea 1989-2009.



Fig. 8. Some of the international participants (all from left to right). Top row: Olov Hedberg and Inga Hedberg (Sweden), Christian Puff (Austria), Sylvia Phillips (UK); middle row: Ib Friis (Denmark), Inger Nordal (Norway), Mike Gilbert and Phil Cribb (UK); bottom row: David Goyder and Sally Bidgood (UK), Kaj Vollesen (UK and Denmark), Henk Bentje (UK and Netherlands).

Contribution of resident botanists in the writing up of the Flora

The contribution of resident botanists has increased over the years. It started with modest contribution of 4% at the beginning of the publication of the Flora in 1989 to about 100% in 2004 (Table 3). Their contribution varied with the Families they were assigned to work.

Table 3. Contribution of resident botanists in percentage between 1989-2009.

Volume	Families	Year of publ.	No. of Fam/Vol	Resident Contributors in %
3	Pittosporaceae to Araliaceae	1989	46 (50)	4
2(2)	Canellaceae to Euphorbiaceae	1995	28	39
7	Poaceae	1995	1	0
6	Hydrocharitaceae to Arecaceae	1997	48	40
2(1)	Magnoliaceae to Flacourtiaceae	2000	59(61)	25
4(1)	Apiaceae to Dipsacaceae	2003	13	15
4(2)	Asteraceae	2004	1	100
5	Gentianaceae to Cyclocheilaceae	2006	28	50
1	Lycopodiaceae to Pinaceae	2009	41	39



Fig. 9. Resident contributors to Flora (from left to right). Top row: Tewolde-Berhan Gebre-Egziabher, Mesfin Tadesse, Sebebe Demissew and Ensermu Kelbessa; bottom row: Sue Edwards, Demel Teketay, Sileshi Nemomissa, Zemed Asfaw and Mirutse Gidey. Among the resident contributors, the photos of Yilma Tesfaye and Mirutse Gidey were not available for inclusion here.

2.2. Objective 2. Strengthening the National Herbarium

2.1. The National Herbarium (ETH) and plant specimens

The National Herbarium (ETH) (Fig. 10) in Addis Ababa University was established in 1959 with the donation of about 6,000 specimens by an Irish forester, Herbert F. Mooney (Fig. 11).

The National Herbarium is an internationally recognized botanical institution with an acronym (ETH). It is one of herbaria known in the world (Holmgren *et al.*, 1981).

Mooney had sent specimens to Kew for identification and received the properly identified plant specimens. The contribution of Mooney was documented by Mesfin Tadesse (1991).



Fig. 10. Historical building in Arat Kilo, College of Natural Sciences, where Addis Ababa University College started, now housing the National Herbarium (ETH) to the left and the Natural History Museum (to the right).



Fig. 11. Herbert F. Mooney (Courtesy of the National Herbarium).

The number of collections between 1959 and to the beginning of the Ethiopian Flora Project in 1980, were about 16,000. The number has increased to the current level of over 80,000.

International collaboration

With the progress in writing the Flora of Ethiopia, the National Herbarium was able to host the 17th AETFAT Congress in 2003, attended by many botanists from Africa, Europe, the USA and Australia. This had motivated the Catholic University in Gent to donate old collections made by W.G. Schimper including type specimens through BR in Belgium.

The National Herbarium has increased its contacts with major European Herbaria (The Royal Botanic Gardens, Kew, UK; Department of Evolutionary Biology, Uppsala, Sweden; Botanical Museum, University of Copenhagen, Copenhagen, Denmark, Herbarium of the University of Vienna, Vienna, Austria; Department of Plant Taxonomy, Wageningen Agricultural University, Wageningen, the Netherlands; African Herbaria (East African Herbarium, National Museums of Kenya, Nairobi, Kenya;

2.3. Objective 3. Training

The third objective, “Promote scientific activities in taxonomic botany, economic botany, forestry, plant ecology, plant physiology, etc. through training” was the first to be tackled as it was considered paramount for the sustainability of the project - during its life time and beyond.

Eleven PhD’s and one illustrator were directly and indirectly trained by the Flora project (Table 4).

Table 4. PhD training and illustration support by the Ethiopian Flora Project.

	Name	Subject Area	Graduated in	From	Current Address
Training with direct support by the EFP	MesfinTadesse	Plant Taxonomy	1984	Uppsala University	USA
	Sebsebe Demissew	Plant Taxonomy	1985	Uppsala University	Ethiopia
	Endashaw Bekele	Plant Genetics	1986	Lund University	Ethiopia
	Legesse Negash	Plant Physiology	1988	Lund University	Ethiopia
	Zemedede Asfaw	Ethnobotany	1989	Uppsala University	Ethiopia
	Ensermu Kelbessa	Plant Taxonomy	1990	Uppsala University	Ethiopia
	Elisabeth Kebede	Limnology	1998	Uppsala University	UK
	Damtew Tefera	Illustration & publishing	1994	UK	USA
Indirect support for Training	Zerihun Woldu	Plant Ecology	1985	Uppsala University	Ethiopia
	Tamrat Bekele	Plant Ecology	1994	Uppsala University	Ethiopia
	Demel Teketay	Forestry		Umea University	Botswana
	Sileshi Nemomissa	Plant Taxonomy		Vienna University	Ethiopia

2.4. Current staff members of the National Herbarium

Currently, the National Herbarium has 14 associated staff, 7 teaching staff, 6 technical staff and a librarian.



Fig. 13. Staff members associated with the National Herbarium in 2010 from left to right.: Top row: Ensermu Kelbessa, Sebsebe Demissew, Sileshi Nemomissa, Tamrat Bekele, Zemedede Asfaw; middle row: Zerihun Woldu, Mekbib Fekadu (all teaching staff members); Melaku Wondafrash, Shewangziw Lemma, Fiseha Getachew; bottom row: Almaz Lemma, Elias Zewde, Assefa Hailu and Wege Abebe (technical staff members and librarian).

3. INTRODUCTION TO THE GULELLE BOTANIC GARDEN

3.1. Background

A detailed report on the need for botanic gardens in Ethiopia in general, the efforts made and the role played by the Flora Project to establish a botanical garden and the birth of the Gulelle Botanic Garden (Fig. 14) is documented in detail by Ensermu Kelbessa (2011).

The Gulelle Botanic Garden (GBG) is located in two sub-cities of Addis Ababa, Kolfe-Keranyo and Gulelle. The area that the Botanic Garden covers is currently 709 hectares, of which about 50 hectares is planned to be developed as a Cultivated Garden (Ensermu Kelbessa, 2011). “The Gulele Botanic Garden occupies an area of about 709 hectares (936 ha including land belonging to the adjacent Oromia Region). The site is inhabited not only by an economically important timber tree, *Juniperus procera* but it is also home for about 300 species of vascular plants, more than 30 of which are endemic to Ethiopia (Ensermu Kelbessa, 2005). The Gulele Botanic Garden was demarcated in early 2005 and a Memorandum of Understanding was signed on 22 April 2005 between the Addis Ababa City Administration and Addis Ababa University to jointly develop the

Garden. The Gulelle Botanic Garden was officially inaugurated on the 6th of October 2005.

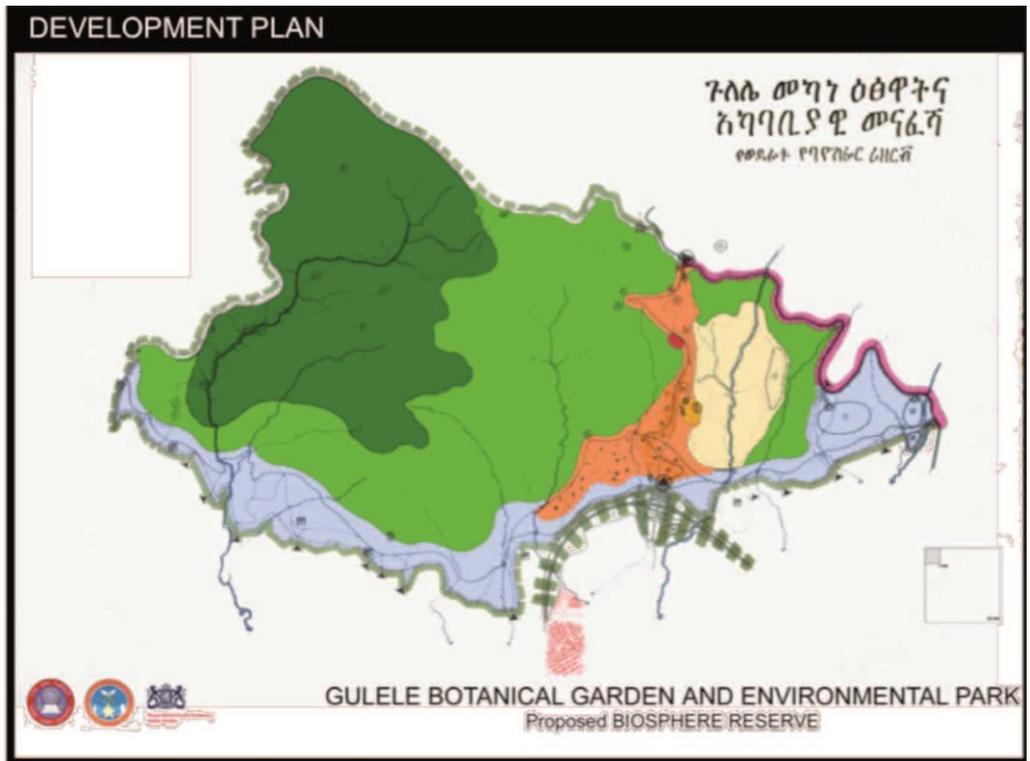


Fig. 14. Gulelle Botanic Garden.

Administration of the Gulelle Botanic Garden

The GBG is now an independent institution under the Addis Ababa Municipality based on a City Council's proclamation. In the proclamation:

It is clearly stated that Addis Ababa University (AAU) and the GBG will work together to develop the garden.

The AAU will also conduct all kinds of research in it and the AAU will work with the Friends of the Gulelle Botanic Garden to facilitate the demonstration of relevant technologies that can stimulate sustainable development in the country.

What was envisaged was:

The two parties would work jointly in a collaborative manner in all matters regarding the botanical garden, both administrative and financial, and technical.

Assignments would be delegated to a party based on expertise and relevance.

In this regard there was a general understanding that the Conservation, Education, Research and Provision of material would be assigned to a party or the parties.

On the way forward, the current GBG office and the National Herbarium on behalf of AAU invited Heads and Directors of international Botanic Gardens to share experiences with the newly established botanic garden, the Gullele Botanic Garden.

A summary of the discussions and the recommendations made is shown here as Annex 1.

ANNEX 1. WORKSHOP REPORT GULLELE BOTANIC GARDEN 7-11 NOV. 2010

Team 2: Recommendations of national and international experts on the management plan and future steps of botanic garden development

Participants:

Prof. Thomas Borsch (Director, Botanical Garden and Botanical Museum Berlin-Dahlem)

Prof. David Mabberley (Keeper of the Herbarium, Royal Botanic Gardens, Kew)

Prof. Jan Rammeloo (National Botanic Garden of Belgium)

Mr. Phillip Le Roux (Director, Kirstenbosch Botanic Garden)

Prof. Inger Nordal (University of Oslo)

Prof. Inga Hedberg (University of Uppsala)

Prof. Ib Friis (University of Copenhagen)

Dr. Sylvia Phillips (Royal Botanic Gardens, Kew)

Dr. Mike Gilbert (Missouri Botanical Garden and Royal Botanic Gardens, Kew)

Prof. Mesfin Tadesse (Ohio State University, USA)

Prof. Sebsebe Demissew (Director, National Herbarium of Ethiopia)

Ato Tekle Wolde Gerima (Executive Director, GBG)

Ato Abebe Bogale

The discussion was based on the premise that Gullele Botanic Garden (GBG) should develop as an institution based on international standards of Botanic Gardens (e.g., Action Plan of the African Botanic Garden Network, International Agenda for Botanic Gardens in Conservation). More precisely, this means that the institution will work in the fields of scientific research, conservation and biodiversity, heritage/culture/tourism, education/training/awareness, networking and capacity building.

All participants of the workshop agreed that there is an urgent need to develop a strategic plan for the **institutional development** of GBG. It was recognized that the landscaping design work so far was very advanced, whereas the needed strategic plan should consider the following areas:

- Building infrastructure, landscaping and habitat/vegetation restoration
- Scientific collections, research and conservation programs
- Education
- Marketing, tourism, and recreation
- Administration, staff and finance

As a prerequisite for institution building, the current **organizational structure** of GBG was discussed. In order to implement adequate management structures, it was proposed to establish an **executive board** that should consist of the executive director of GBG and five unit directors representing the above mentioned areas. In terms of the organisational structure the five unit directors, each heading respective units, would work at the same hierarchical level, following next under the executive director. This would require to modify the organogram of GBG accordingly. The executive board would make corporate decisions and would have to meet on a regular basis (weekly). Functions of executive board members should be clearly defined (with a detailed task description) and approved by the Board of GBG. Appointment of executive board members (= unit directors) has to be based on technical, administrative or scientific expertise and merits. Depending on the area, appointments of persons with recognized capacity

who are already working in another institution (e.g. university) can be unit directors. This should be encouraged to effectively organize science, research and conservation that requires academic expertise (to be basically carried out by university staff). It was recognized that the described organisational structure consisting of executive director and executive board is implemented in all larger, and internationally renowned Botanic Gardens. In fact, it will be required for efficient and clear decision making because botanic gardens are complex institutions where the management staff has to cover a broad range of specialized qualifications.

The group appreciated that time plays an important role in the development of GBG. For the institution to become fully operational it was suggested that the executive director should request to the Board of GBG the appointment of an executive board as soon as possible.

In order to quickly become fully operational it was considered as important that task forces for each of the five areas should be established to work out the strategic plans for each of the five areas/units, each of which requires different kind of expertise. Task forces should be composed of a small number of persons including the respective executive board member, further GBG staff (internal) and external experts. The task forces have to identify relevant topics or capacities to be built, suggest priorities, milestones and a timetable for implementation. The executive director of GBG and the other executive board members (internal) should then integrate task force results into an overall strategic plan for GBG. This strategic plan should further be evaluated by an advisory committee (external experts) and has to be approved by the Board of GBG. All decisions can then be made internally in the GBG based on the strategic plan.

The workshop already identified several important issues to be considered in the five different areas that will be summarized in the following.

Building infrastructure, landscaping and habitat/vegetation restoration

The main buildings of GBG (offices, science building etc.) should be given priority to make GBG operational. Fencing and relocation of people living on grounds that are needed for other uses also are important. The landscaping design appears to be too ambitious. Especially bridges etc. appear to be too costly and not necessary for the initial implementation of GBG. Necessary budgets for annual maintenance costs for all infrastructure needs to be estimated and planned in into the garden's budget. Greenhouses should be reconsidered with respect to adequate technology (is a very

specific field that only experienced greenhouse builders can cope with; otherwise there is risk of unfavourable conditions for plants and/or too high operating costs).

Because of the ecological conditions of the area, some of the proposed Ethiopian plant communities will be very difficult to establish. Therefore, emphasis should be placed on the easiest to establish vegetation types and the regeneration of natural vegetation of the area. All plant material that is brought from outside into the garden (except ornamental plants in beds and displays) must be of documented origin. Nursery establishment should have priority and the respective production of native trees can probably be done by gardeners/foresters with average training level. It was agreed that the Eucalyptus trees have to be removed, although a careful implementation is recommended. Experiences in other areas close by (e.g. Entoto) should be considered as well as from other countries such as South Africa or the Mediterranean (rich literature exists). Resprouting of Eucalyptus may have to be suppressed. Monitoring of respective should be carried out to evaluate success of restoration of the native Juniper forest (permanent plots, analysed for vegetation structure and vascular plant species composition). Management of other invasive plants is important (e.g. *Acacia* species originating from Australia already colonizing parts of the garden area is a risk). These activities have to be harmonized with adjacent administrative regions. Within this unit, a subunit “Facility management” appears useful that runs infrastructures economically and also deals with issues such as use of sustainable energy and materials; it should also organize the purchasing activities.

Scientific collections, research and conservation programs

Development of scientific plant collections in the garden needs to be based on the selection of important Ethiopian plant groups and should go hand in hand with respective research and conservation programs. A documentation system needs to be established, ideally in conjunction with the herbarium (voucher specimens for plants in the Garden). Specific training for gardeners working with these collections needs to be planned in as the regular horticultural training is not sufficient. Plants in vegetation displays should also be documented and part of the collection strategy. Decision on actual species to be planted/collected should actually be made by scientific curators of the collection. The prevention of interbreeding of species that are normally not closely associated in natural habitats as well as reproductive biology life span data need to be available for the species. It is

recommended to rather start with a small collection and build this up gradually. The numbers of curators and gardeners need to be based on the collections (can be later increased).

The research and collection program has to be integrated into needs of biodiversity conservation and sustainable use in Ethiopia (e.g., National Biodiversity Strategy and Action Plan) and respective research and training activities at the university. Also, relevance should be evaluated based on an international context.

Education

Should take biodiversity conservation and sustainable use needs into account and has to involve advice from a number of stakeholders (e.g. schools, universities, museums, didactics specialists). It is to be noted that a professional display of plants requires a lot of attention and time (layout of visitor information system; topics to be presented; materials and media to be used). Education has to be planned in line with the collection strategy. Visitor information system should be clarified at an early stage as it is a lot of effort to plan and implement (2 years). Costs are significant and need to be included into general budget. The university and the city administration should consider using GBG as a “window to the public” also for activities not directly dealing with plants.

Marketing, tourism, and recreation

It would be good to assess who will be the future visitors of the garden. Most likely, there will be different groups of persons. Entrance fees, qualities of restaurants have to be adjusted. A marketing concept should be closely interlinked from the beginning with marketing of tourism in Addis Ababa in general and other museums etc.

Administration, staff and finance

It seems most efficient if organized in a single unit. Separate budgeting of the five different units (in the organizational structure) is highly recommended and should be based on milestones to be achieved/activities to be carried out as agreed upon in the strategic plan. Complementary funding of individual budgets from different sources appears probable.



Fig. 15. Part of the participants of the workshop on the flora project and Gulelle Botanic Garden (from right to left). Front row: Mesfin Tadesse, Sylvia Phillips and Inger Nordal; middle row: Ib Friis, Jan Rammeloo, David Mabberely, Mike Gilbert, Inga Hedberg, Sally Bidgood, Kaj Vollesen, Ensermu Kelbessa; back row: Thomas Borsch and Sebsebe Demissew.

4. CONCLUSION AND ACKNOWLEDGEMENTS

4.1. Conclusions

In 2009, all the objectives were met. There was success in training Ethiopian nationals, who now train more Ethiopians in country and from the neighbouring countries; the Ethiopian Flora Project was completed with international support and collaboration and outstanding contributions by a number of individuals and institutions; the National Herbarium (ETH) collections grew from 16,000 to 80,000 and scientific activities in taxonomic botany, economic botany, forestry, plant ecology, plant physiology, etc. have been achieved through training.

4.2. Acknowledgements

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