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Front cover photographs:

Top: Blue-winged Geese (Yilma Dellelegn Abebe)

Below: Ethiopian Wolf (Martin Harvey)

Background: Afro - alpine Area (Martin Harvey)

Back cover: A flowering branch of *Ochna leptoclada*



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New Plant Records for the Ethiopian Flora from Benishangul Gumuz Region, Western Ethiopia

Tesfaye Awas¹, Sebsebe Demissew^{2*}, Inger Nordal¹ and Ib Friis³

Abstract

Six plant species, *Acalypha bipartita* Muell. Arg. (Euphorbiaceae), *Dalbergia boehmii* Taub. (Fabaceae), *Dorstenia benguellensis* Welw. (Moraceae), *Hyparrhenia bracteata* (Willd.) Stapf (Poaceae), *Ochna leptoclada* Oliv. (Ochnaceae) and *Scleria greigiifolia* (Ridley) C. B. Cl. (Cyperaceae) were recorded from Benishangul Gumuz Region, Western Ethiopia as new additions to the Ethiopian flora.

Key Words and Phrases: Benishangul Gumuz, Conservation, Ethiopian flora, Phytogeography.

Introduction

The Ethiopian flora is estimated to contain between 6,500 and 7,000 species of higher plants (Tewolde Brehan Gebre Egziabher, 1991), of which about 12% are endemic. Precise information on the Ethiopian flora could only be obtained when studies are undertaken in the various parts of the country where little or no botanical explorations have been made. Benishangul Gumuz Region in Western Ethiopia is one of the least botanically explored regions (Sebsebe Demissew *et al.*, 2005) and a number of new records have been published as additions in Flora of Ethiopia and Eritrea (Edwards *et al.*, 2000).

Vegetation in this region is part of Sudanian center of endemism named by White (1983),

as undifferentiated woodlands (Ethiopian type) and characterized by broadleaved deciduous trees (Fig. 1).

The most common tree species are *Anogeissus leiocarpa*, *Balanites aegyptiaca*, *Boswellia papyrifera*, *Combretum collinum*, *Dalbergia melanoxylon*, *Lanea fruticosa*, *L. welwitschii*, *Lonchocarpus laxiflorus*, *Pterocarpus lucens*, *Piliostigma thonningii*, *Stereospermum kunthianum*, *Terminalia laxiflora* and *T. macroptera*. The solid-stemmed bamboo *Oxytenanthera abyssinica* is common on escarpments and hilly areas, while *Hyphaene thebaica* is characteristic species in the lowland plain. The ground cover is dominated by herbaceous geophytes such as *Crinum*, *Hypoxis*, *Ledebouria*, *Chlorophytum*, *Costus*, *Eulophia*,

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Habenaria, *Dorstenia* and *Drimiopsis* at the beginning of rainy season (May and June). Toward the end of the rainy season

between latitudes 09° 17' and 12° 06' N and longitudes 34° 10' and 37° 04' E. The region is bordered by Amhara Regional State to the



Figure 1 : Vegetation type near Anbesa Chaka

(September and November) a tall stratum of perennial grasses, including species of *Hyparrhenia*, *Andropogon*, *Rottboellia*, *Panicum*, *Cymbopogon* and *Pennisetum* become dominant. This vegetation has been adapted to annual fire which is mostly set by local people in December and January. Among plant specimens collected from this vegetation, six species are recognized as new additions to Ethiopian flora and presented in this paper. Their importance in phytogeographic study and conservation planning were discussed.

Materials and Methods

The study was conducted in the Benishangul Gumuz Region, Western Ethiopia, located

north, Oromiya Regional State to the east and south, and the Republic of Sudan to the west. The eastern parts of the region have an elevation about 2,700 meters above sea level. Elevation decreases gradually toward the western part to an average altitude of 500 m along Ethio-Sudanese Border. The region was established in 1994 by the 1994 constitution of Ethiopia. Before this time the area south of Blue Nile belonged to Welega while the northern part to Gojam Flora Regions.

A total of 504 plant specimens were collected by the first author of this paper between 2001 and 2005. Most of the specimens were identified with the help of Floras and by comparing with already identified herbarium specimens at National Herbarium (ETH),

Ethiopia. Those which are new to Ethiopian flora were identified at Royal Botanic Gardens (K), England. All specimens were deposited at the ETH and Institute of Biodiversity Conservation/Ethiopia.

Results

In the course of identification of plant specimens collected from Benishangul Gumuz Region (Figure 2) by the first author of this paper, five species *Acalypha bipartita* Muell. Arg. (Euphorbiaceae), *Dalbergia boehmii* Taub. (Fabaceae), *Dorstenia benguellensis* Welw. (Moraceae), *Ochna leptoclada* Oliv. (Ochnaceae) and *Scleria greigiifolia* (Ridley) C. B. Cl. (Cyperaceae) did not match with any specimen collected from Ethiopia and deposited at the National Herbarium of Addis Ababa University (ETH),

Pillips, 1995; Vollesen, 1995; Lye, 1997). The specimens were identified by comparing with already identified herbarium specimens at Royal Botanic Gardens (K), England and with the help of published literature and Flora (Smith, 1987; Gillett *et al.*, 1971, Berg and Hijman, 1989; Berg, 1991; Clayton, 1969; Clayton *et al.*, 2002; Cope, 2002; Verdcourt, 2005; Haines and Lye, 1983). Those species which are not included in the published flora of Ethiopia and Eritrea were recognized as new additions to Ethiopian Flora. Another species, *Hyparrhenia bracteata* (Willd.) Stapf (Poaceae), previously found in Benishangul Gumuz Region in 1998 by Friis *et al.* 9201 (K), but not yet recorded in the Flora of Ethiopia and Eritrea was also recollected and treated here as an addition to the Ethiopian Flora.

Information on morphology and habitats of all

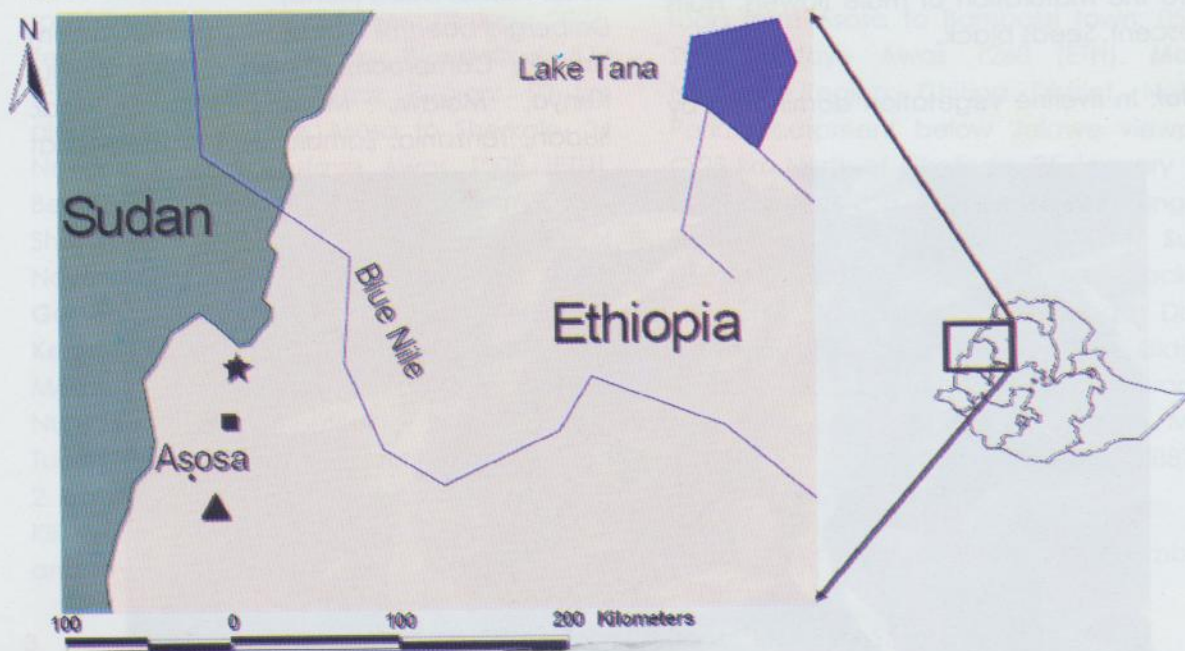


Figure 2: Collection localities of new plant records for Ethiopian flora from Benishangul Gumuz Region: *Acalypha bipartita* (★), *Dalbergia boehmii* (■), *Dorstenia benguellensis* (▲), *Hyparrhenia bracteata* (▲), *Ochna leptoclada* (▲) and *Scleria greigiifolia* (▲).

neither possible to key out them to species level using the published Ethiopian Flora and Eritrea (Friis, 1989; Thulin, 1989; Gilbert, 1995;

species are given below based on the Ethiopian materials. Their distribution in Africa

was extracted from literatures. Some of the specimens examined were also presented.

1. *Acalypha bipartita* Muell. Arg.
(Euphorbiaceae)

Acalypha bipartita was previously known from Sudan, Uganda, Kenya, Tanzania, Rwanda, Burundi and Congo at an altitudinal range of 1100-1500 m (Smith, 1987). In Ethiopia it occurs below the lower altitudinal range known for the species, i.e. 755 m.

Herb 0.5-1 m high from perennial rootstock. Leaves ovate, acuminate, serrate, pubescent on nerves, up to 7.5 cm wide and 15.7 cm long. Inflorescence bisexual, axillary, up to 13 cm long, with a terminal male portion and female bracteate units on peduncle up to 2.2 cm below the male portion. Ovary covered by two clasping sepals. Ovary set seeds before the maturation of male flowers. Fruits pubescent. Seeds black.

Habitat: In riverine vegetation dominated by

Anogeissus leiocarpa, *Diospyros mespiliformis* and *Tamarindus indica*.

Specimens Examined: Ethiopia. Benishangul Gumuz Region, 2 km from Sherkole town to Thoyiba village, 26 June 2001, Tesfaye Awas and Melaku Wondafraash 899A (ETH). Benishangul Gumuz Region, 2 km from Sherkole town to Thoyiba village, 01 July 2005, Tesfaye Awas 1254 (ETH). **Sudan.** Lado Yei River, 10 November 19191, Sillitoe 224 (K). Imatong Mountains, Southern Sudan, 27 November 1980, Friis & Vollesen 512 (K). **Tanzania.** Bokoba District, Karagwe, Expedition to the source of the Nile-1860-1863, Speke and Grant 161 (K, Holotype). **Uganda.** Kitubulu, Entebbe, October 1931, Eggeling 187 (K).

2. *Dalbergia boehmii* Taub. (Fabaceae),
Local Name: Tsaba (Berta)

Dalbergia boehmii was previously known from Angola, Cameroon, Congo, Guinea Bissau, Kenya, Malawi, Mozambique, Senegal, Sudan, Tanzania, Zambia and Zimbabwe at



Figure 3: A fruiting branch of *Dalbergia boehmii*

an altitudinal range of 0-1720 m (Gillett *et al.*, 1971).

Tree 4-6 m high. Leaves compound, alternate. Leaflets up to 4.8 cm wide and 8 cm long. Pods papery, up to 10 mm wide and 8 cm long, contain 1-3 seeds. Seeds kidney shaped, up to 4 mm wide and 5 mm long (Fig. 3).

Habitat: In riverine vegetation dominated by *Anogeissus leiocarpa*, *Diospyros mespiliformis* and *Tamarindus indica* and broadleaved woodland dominated by *Combretum collinum*, *Terminalia laxiflora*, *Albizia malacophylla*, *Pterocarpus lucens* and *Ozoroa insignis*; 755-1250 m.

Specimens Examined: **Congo.** Katanga Prov., Elisabethville Territ., Keyberg, 8 km S.O. d'E`ville, October 1949, Schmitz 2627 (K). **Ethiopia.** Benishangul Gumuz Region: 47 km along the road from Asosa to Sherkole, 18 June 2001, Tesfaye Awas and Melaku Wondafrash 874 (ETH). Benishangul Gumuz Region: 50 km along the road from Asosa to Sherkole, 24 November 2004, Tesfaye Awas 1205 (ETH). Benishangul Gumuz Region: 2 km from Sherkole town to Thoyiba village. 24 November 2004, Tesfaye Awas 1207 (ETH). **Guinea Bissau.** 25 May 1948, Santo 2479 (K). **Kenya.** Kwale District, Muhaka Forest, 02 March 1977, Faden 77/595 (K). **Sudan.** Numatinna River (Tributary of Jur), undated, Turner 281 (K). **Tanzania.** Nachingwea District, 2 km east of Mtua Village on Nachingwea-Kilimarondo road, 01 November 78, Magogo and Innes 253 (K).

3. *Dorstenia benguellensis* Welw.

(Moraceae)

Dorstenia benguellensis was previously known from Sudan, Uganda, Kenya, Tanzania, Rwanda, Burundi, Central African Republic, Cameroon, Congo, Angola, Zambia, Zimbabwe, Malawi and Mozambique at an altitudinal range of 1000-2450 m (Berg and Hijman, 1989; Berg, 1991).

Herb 15-55 cm high. Emerge from perennial underground tuber. Tuber discoid, warty. Milky latex ooze out when cut. Leaves up to 16 mm wide and 9 cm long, margin dentate. Inflorescences axial, solitary.

Habitat: Under the shade of broadleaved woodland dominated by *Oxytenanthera abyssinica*, *Combretum collinum*, *Terminalia laxiflora*, *Securidaca longepedunculata*, *Lonchocarpus laxiflorus*, *Entada africana*, *Albizia malacophylla*, *Piliostigma thonningii* and *Syzygium guineense*; 1460 m.

Specimens Examined: **Angola.** December 1859, Welwitsch 1566 (K). **Burundi.** 10 February 1978, Reekmans 7319 (K). **Cameroon.** Buar, May 1914, Mildbraed 9382 (K). **Ethiopia.** Benishangul Gumuz Region: 22 km along the road from Asosa to Bambassi town, 05 July 2005, Tesfaye Awas 1260 (ETH). **Malawi.** Northern Region: Chitipa District, National Park, Escarpment below Jalawe viewpoint. C.25 km North of Chelinda, 25 January 1992, Goyder *et al.* 3582 (K). **Rwanda.** Kibungu, 08 September 1958, Alcool 8180 (K). **Sudan.** Loka-Bibi road, Yei District, undated, Jackoson 3204 (K). **Tanzania.** Sumbawanga District: Tatanda Mission, 23 February 1994, Bidgood *et al.* 2416 (K). **Uganda.** Napak, Karamoja, June 1950, Eggeling 5924 (K). **Zambia.** Mbala District, Itembwe GP, 1968, Richards 22887 (K).

4. *Hyparrhenia bracteata* (Humb. &

Bonpl. ex Willd.) Stapf

Hyparrhenia bracteata was previously known from tropical Africa, mainly in the west. It was recorded from Burkina Faso, Ivory Coast, Nigeria, Cameroon, Central African Republic, Congo, Burundi, Uganda, Kenya, Tanzania, Mozambique, Malawi, Zambia, Zimbabwe and Angola (Clayton, 1969). It also occurs in China, India, Malaysia, Mexico and Brazil

(Clayton *et al.*, 2002), at an altitudinal range of 1000-1650 m (Cope, 2002).

Perennial grass 1-2 m high. Leaf sheaths pilose. Racemes 2 awned per pair. Awns up to 2 cm long.

Habitat: *Habitat:* In seasonally wet grassland dominated by *Cyperus spp.*, *Kotschy africana*, *Pycnostacys niamniamensis*, *Loudetia phragmitoides*, *Platostoma rotundifolium* and *Scleria spp.*; 1450-1480 m.

Specimens Examined: **Ethiopia.** Benishangul Gumuz Region: 23 km along the road from Asosa to Bambassi town, 01 December 2004,

1975, Hall IV16 (K). **Nigeria.** N.E. State, Mabilla Plateau, Nguraje Forest reserve, 29 December 1975, Chapman 4071 (K). **Sudan.** Imatong Mountains, Gilo, near the bridge across Ngairigi River, 13 November 1980, Friis & Vollesen 201 (K).

5. **Ochna leptoclada** Oliv. (Ochnaceae)
Ochna leptoclada was previously known from Congo, Rwanda, Burundi, Sudan, Zambia, Malawi, Mozambique, Tanzania, Uganda and Zimbabwe at an altitudinal range of 250-1650 m (Verdcourt, 2005).

Bushy shrub 30-50 cm high; emerge from woody root stock. Stem grayish white Leaves



Figure 4: A flowering branch of *Ochna leptoclada*

Tesfaye Awas 1240 (ETH). Benishangul Gumuz Region: c. 28 km South of Asosa along the road to Bambassi, 23 November 1998, Friis *et al.* 9201 (K). **Ivory Coast.** Nr. N. bank of River Fahlogo, N. of Korhogo to Badikaha road and E. of Bandama Blanc River, 16 November

ob lanceolate, up to 2.5 cm wide and 9 cm long. Fruiting calyx red, up to 8mm wide and 12mm long (Fig. 4).

Habitat: In open places and under the shade of broadleaved woodland dominated

(Clayton *et al.*, 2002), at an altitudinal range of 1000-1650 m (Cope, 2002).

Perennial grass 1-2 m high. Leaf sheaths pilose. Racemes 2 awned per pair. Awns up to 2 cm long.

Habitat: *Habitat:* In seasonally wet grassland dominated by *Cyperus* spp., *Kotschya africana*, *Pycnostacys niamniamensis*, *Loudetia phragmitoides*, *Platostoma rotundifolium* and *Scleria* spp.; 1450-1480 m.

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Bushy shrub 30-50 cm high; emerge from woody root stock. Stem grayish white. Leaves



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Habitat: In open places and under the shade of broadleaved woodland dominated

by *Oxytenanthera abyssinica*, *Combretum collinum*, *Terminalia laxiflora*, *Securidaca longepedunculata*, *Lonchocarpus laxiflorus*, *Entada africana*, *Albizia malacophylla*, *Piliostigma thonningii* and *Syzygium guineense*; 1490 m.

Specimens Examined: **Burundi.** Bubanza, 25 September 1976, Reekmans 5339 (K). **Central African Republic.** Monovo-Gounda, 8 km south of Goumba, 1981, Fay 5345 (K). **Congo.** 22 October 1911, Rogers 10160 (K). **Ethiopia.** Benishangul Gumuz Region: 23 km along the road from Asosa to Bambassi town, 05 July 2005, Tesfaye Awas 1274 (ETH). **Rwanda.** Nyauza, Lake Tangayika, 60 km north of Kigoma, 29 July 1920, Shantz 691 (K). **Sudan.** Numatuna River Distr., undated, Turner 281 (K). **Tanzania.** Ulanga District, Msolwa Camp, 02 November 1977, Vollesen 4754 (K).

6. *Scleria greigiifolia* (Ridley) C. B. Cl.
(CYPERACEAE)

Scleria greigiifolia was previously known from Uganda, Tanzania, Congo, Zambia, Malawi, Zimbabwe, Angola and Madagascar at an altitudinal range of 1140-1160 m (Haines and Lye, 1983).

Sedge 1-1.5 m high, emerging from woody rhizomes. Stem triangular, scarbrid on the angles. Leaves up to 60 cm long and 13 mm wide, scarbid on the margin and ribs. Inflorescence brown, consist of one terminal and several lateral panicles. Peduncles up to 20 cm long.

Habitat: In seasonally wet grassland dominated by *Cyperus* spp., *Kotschya africana*, *Pycnostacys niamniamensis*, *Loudetia phragmitoides*, *Platostoma rotundifolium* and *Scleria* spp.; 1480 m.

Specimens Examined: **Ethiopia.** Benishangul Gumuz Region: 23 km along the road from

Assosa to Bambassi town, 01 October 2005, Tesfaye Awas et al. 1355 (ETH). **Tanzania.** Bushasha Swamp, 14 August 1934, Gillman 92 (K). **Uganda.** East of Nabugabo Seminary Resort, 28 July 71, Katende 1218 (K).

Discussion

The distribution of plants recorded in this study extends from Ethiopia to Senegal in the western Africa and to Mozambique in the southeastern and Angola in the southwestern Africa. These areas belong to the Sudanian and Zambezan vegetation regions. Such distribution patterns may help in the analysis of the phytogeographical affinity of the Benishangul Gumuz region's vegetation and in planning conservation activities.

Although all species are wide spread, the Ethiopian populations are geographically marginal towards north east border of the Sudanian vegetation region with elements from Zambezan vegetation region. Marginal populations, being far from the central population and with low rate of gene exchange, might have unique adaptations although morphologically appear rather similar to the plants found in more central areas of the wide distribution. Marginal populations are more sensitive to environmental changes and also affected by factors such as directional selection, genetic drift and inbreeding (Soulé, 1973, Gao et al., 2000). It is therefore, necessary to start conservation initiatives in Benishangul Gumuz Region before these marginal populations are lost.

Previously 14 species of *Acalypha* (Gilbert, 1995), 5 species *Dalbergia* (Thulin, 1989), 7 species of *Dorstenia* (Friis, 1989), 6 species of *Ochna* (Vollesen, 1995), 30 species of *Hyparrhenia* (Phillips, 1995) and 14 species of *Scleria* (Lye, 1997) were recorded for the Ethiopian Flora. Five of the newly recorded

species, except *A. bipartita*, were collected along all weather roads. *Dorstenia benguellensis*, *Hyparrhenia bracteata*, *Ochna leptoclada* and *Scleria greigiifolia* were collected from the same locality (Figure 2), about 21-28 km along the road from Asosa, the capital town of Benishangul Gumuz Region, to Addis Ababa. This locality is locally known as 'Anbesa Chaka'-Lions forest, previously well known site to see Lion. Recently this site is reduced to a patch of *Oxthenthera abyssinica* woodland by the pressure from settlers. Detailed botanical exploration to this site and other inaccessible areas in Benishangul Gumuz is recommended to come up with complete information on the plants in Benishangul Gumuz Region in particular and Ethiopian Flora in general.

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The Ethiopian Wildlife and Natural History Society works to enhance the conservation and sustainable use of natural resources and protection of the environment through awareness-raising, education, research and advocacy.

