

# Taxonomic novelties in Central African grasses (Poaceae), Paniceae 1

Marc S.M. Sosef

Botanic Garden Meise, Nieuwelaan 38, BE-1860 Meise, Belgium  
Email: [marc.sosef@plantentuinmeise.be](mailto:marc.sosef@plantentuinmeise.be)

**Background and aims** – Within the framework of the renewed production of the *Flore d’Afrique centrale*, a manuscript will be prepared on the grasses. Taxonomic novelties, or other information not deemed appropriate in a Flora, will be published in a series of separate papers of which this is the first. The history of research on Central African grasses is briefly sketched.

**Methods** – Standard herbarium techniques have been applied to material from BR, BRLU, GENT, LG and WAG. Some types were studied through the JSTOR Global Plant facility.

**Key results** – Novelties are presented for the genera *Acroceras*, *Axonopus*, *Paspalum* and *Urochloa* (incl. *Brachiaria*). Ten new combinations are made. Lectotypes are designated for thirteen names. Eleven names are treated as new synonyms of existing species names, with discussions on the new taxonomic concepts applied. Four species represent new records for the Democratic Republic of the Congo.

**Keywords** – Africa, Burundi, Democratic Republic of the Congo, Flora, Gramineae, nomenclature, Rwanda, taxonomy.

## INTRODUCTION

The *Flore d’Afrique centrale* initiative started back in 1942 aiming to treat all plant species of the Democratic Republic of the Congo (DRC), Rwanda and Burundi (Robyns 1946, 1949). The first series, of what was then called the *Flore du Congo belge et du Ruanda-Urundi*, deals with the Spermatophytes, the second one with the Pteridophytes. Series 3 and 4, on mosses and algae, were foreseen, but never realized. To date, about 60% of the estimated 11,000 species of vascular plants have been treated (Léonard 1994). Recently, a serious attempt has started to finish the remaining family treatments for the *Flore d’Afrique centrale* series 1 and 2 within a period of fifteen years (Sosef et al. 2014). More about the history of this Flora and its recent advancements have recently been published (Sosef 2016).

One of the major families still to be dealt with are the Poaceae, with an estimated number of species occurring in that region of close to 750. Our preparation of a manuscript treating the grasses for the *Flore d’Afrique centrale* started end of 2013. The tribe Paniceae (sensu Clayton & Renvoize 1986 and Watson & Dallwitz 1992, not sensu Soreng et al. 2015) is the first to be dealt with. It is one of the largest in Central Africa in terms of the number of species (to date close to 200). Meanwhile, a fair number of taxonomic novelties have turned up, which seem out-of-place in a Flora treatment. Therefore, it was decided to publish these as a series of

separate precursory publications, also so as to reach a wider audience.

More information about the history of this Flora and its recent advancements is provided by Sosef (2016).

## Taxonomic studies on Central African grasses

The taxonomic study of Central African grasses basically started with the general work of Steudel (1854), but at his time only very few collections from DRC, Rwanda and Burundi were available. Only those collected in 1816 by the British Prof. Christian Smith (620 numbers in total, 45 of which are grasses) during his unfortunate journey under the command of Captain Tuckey (Brown 1818) were at Steudel’s disposal. It was not until the 1870s that additional plant collections were made in DRC, mostly by several German collectors (Robyns 1949). Shortly after 1885, when the Belgium King Léopold II created the Independent State of the Congo, intensive botanical inventory work started. Franchet (1895) was the first to specifically study Central African grasses, and although he dealt with the French Congo, now the Republic of the Congo, and Gabon, he laid a firm foundation for further studies on grasses in the region. Shortly after that, De Wildeman studied the grass collections now coming into Belgium by the hundreds, or even thousands, due to an unprecedented collecting effort, followed by an equally impressive research effort, culminating in the first annotated checklist of Congolese plants, the *Sylloge Florae Congolanae* (Durand &

Durand 1909). In the early 1900s, during the colonial period, several test gardens (*Jardins Agrostologiques*) were created by INEAC (Institut National pour l'Étude Agronomique du Congo Belge) to specifically study grasses for their agronomic characteristics. These were realized in various places of DRC (amongst others in Kisantu, Yangambi, Leveville – now Lusanga, Bandundu prov. – and Eala). It was Father H. Vanderyst who published several articles on these and other grasses in the region (Vanderyst 1918, 1919, 1925), although he was much hindered by the limitations World War I implied on the access to collections and libraries. This made him decide to publish his new names as being provisional and therefore invalid in the light of our present-day Code (McNeill et al. 2012, Art. 36.1b). In that same period, Stapf produced his Magnum Opus on the grasses in the *Flora of Tropical Africa* series (Stapf 1919, 1920), describing a large number of new species based on collections from DRC. Vanderyst continued his studies on grasses but with more focus on grass vegetation types and their agronomic values (for example Vanderyst 1932). By that time, Walter Robyns, who later became Director of the National Botanic Garden of Belgium (then Jardin botanique de l'État) and would be the main driving force behind the start of the *Flore d'Afrique centrale* series in 1942, had taken a keen interest in grasses and published two volumes of a *Flore agrostologique du Congo belge et du Ruanda-Urundi* (Robyns 1929, 1934) dealing with the tribes Paniceae, Maydeae and Andropogoneae (with Robyns 1932 being a precursor for his 1934 publication). Unfortunately however, he was never able to complete this work and no major studies on the grasses of Central Africa were produced for over fifty years. Then, the grasses of Rwanda were dealt with by Troupin (1988), while Ndabaneze (1989) provided a most useful checklist of the grasses of Burundi.

To date, the grasses of most of the countries neighbouring DRC, Rwanda and Burundi have been treated, either as an account in a Flora series (Clayton 1970, 1989, Clayton et al. 1974, Clayton & Renvoize 1982, Cope 1999, Koechlin 1962, Launert 1971, Sosef 1999) or as a separate publication (Harker 1960, Kami 1997, Napper 1965, van der Zon 1992). Apart from the DRC, notably the Central African Republic and Angola still remain without a specific treatment of their grass flora.

## MATERIALS AND METHODS

All studies were performed using herbarium material and applying standard herbarium techniques (de Vogel 1987). Acronyms of institutes holding herbarium collections follow Thiers (continuously updated). The vast majority of material came from BR, with additions from BRLU, GENT, LG and WAG. Types not available in one of these, were generally studied using the Global Plants facility (JSTOR 2000–2016).

## RESULTS: TAXONOMIC NOVELTIES IN CENTRAL AFRICAN PANICEAE

### *Acroceras*

*Acroceras amplexans* Stapf (Stapf 1920: 625). – Type: Mali, Ségou, s.d., *Lécard* 246 (lecto-: K, **designated here**; isolecto-: BR, P).

*Brachiaria glycerioides* Chiov. (Chiovenda 1922: 110). – Type: DRC, Kabala, s.d., *Bovone* s.n. (holo-: MOD), **synon. nov.**

Stapf (1920) mentioned six specimens which are to be regarded as syntypes. Although Clayton & Renvoize (1982), van der Zon (1992) and GrassBase (Clayton et al. 2006) all cited only one of the syntypes, *Lécard* 246, no lectotype has ever been formally chosen. This is effected here, and it seems best to follow the previous authors and choose the *Lécard* specimen as such.

*Brachiaria glycerioides* Chiov. has been regarded as a synonym of *Urochloa deflexa* (Schumach.) H.Scholz (Clayton et al. 2006 and various other databases), but the original description clearly mentioned the characteristic flattened tip of the lower glume of *Acroceras*, and the auriculate leaf base of *A. amplexans*. Moreover, I was able to study a photocopy of the type specimen, kept at Modena, Italy (MOD), which confirmed the above.

*Acroceras macrum* Stapf (Stapf 1920: 624). – Type: Angola, S. Angola, Cunene marshes, 21 May 1909, *H.H.W. Pearson* 2024 (lecto-: K, **designated here**).

Stapf (1920: 624) mentioned four specimens which are to be regarded as syntypes. Up to now, no author seems to have chosen a lectotype from amongst these, although *Pearson* 2024 at Kew bears a label indicating it is the 'lectotype'. As there is not much difference between the four specimens, which all carry an identification tag from O. Stapf, it seems best to follow Kew's 'suggestion' and to formally designate *Pearson* 2024 as the lectotype.

### *Acroceras zizanioides* (Kunth) Dandy

*Panicum guluense* Vanderyst (Vanderyst 1919: 248), **nom. invalid.**, **synon. nov.** – Type: DRC, Gulu, Oct. 1919, *Vanderyst* B39 (holo-: BR).

*Panicum guluense* is an obscure name, invalidly published by Vanderyst. In GrassBase (Clayton et al. 2006) it was previously treated as a synonym of *Panicum mueense* Vanderyst, but it seems unclear from where this information originated. The type specimen was located at BR and turned out to represent *Acroceras zizanioides*.

### *Axonopus*

*Axonopus compressus* (Sw.) P.Beauv.

*Axonopus kisantuensis* Vanderyst (Vanderyst 1925: 667). – Type: DRC, Kisantu, s.d., *Vanderyst* 5806 (lecto-: BR, **designated here**), **synon. nov.**

Vanderyst (1925) cited several specimens in the protologue of *A. kisantuensis*, which thus should be regarded as syntypes, but Clayton & Renvoize (1982) and GrassBase

(Clayton et al. 2006) gave only one: *Vanderyst* 5806, which is the first one cited in the protologue. Although both sources do not use the term ‘lectotype’ this could be interpreted as an error to be corrected (Art. 9.23 of McNeil et al. 2012). To avoid future confusion, their choice is explicitly corroborated here.

## *Paspalum*

### *Paspalum dilatatum* Poir.

Although widely introduced in the tropics as a forage grass and a regular escape, this species was never reported from the wild in the DRC. Various specimens prove it was introduced in several experimental gardens from the early 20<sup>th</sup> century onward. Now, two specimens, *A. Schmitz* 489 and *Lisowski* 53819, collected in 1947 at Keyberg and in 1970 at Lubumbashi respectively, indicate it seems to have escaped into the wild at least in the South-East of the country (Haut-Katanga).

### *Paspalum distichum* L.

Although widely distributed, this species is rare in Central Africa. Four specimens, *Lejoly* 5162, *Lisowski* 49764 and 52484 and *Nyakabwa* 1, collected in the years 1978, 1979 and 1981 probably from the same locality along a road in Kisanгани, Province Orientale, DRC, represent the first records of this species in this country. Their locality suggests an introduction but of unknown origin.

### *Paspalum glumaceum* Clayton

This species was published in 1975, as a segregate from the *P. scrobiculatum* complex (Clayton 1975, Koning & Sosef 1985) and said to occur in Sudan, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and Madagascar. Several specimens were discovered from savanna regions in the North and South-East of the DRC (Garamba National Park, Upemba National Park and Katanga province), thus extending its known range.

## *Urochloa*

The genus *Urochloa* P.Beauv. has often been recognized as being a close relative of the younger but much more speciose *Brachiaria* (Trin.) Griseb. However, although seemingly important characters such as the presence of a mucro on top of the upper lemma, the position of the lower glume (adjacent to or facing away from the rachis) or the apex of the spikelet being rounded to acute, or rather long acuminate, may provide diagnostic features for a distinction at regional level, these characters do not hold at the global scale. Moreover, over the past decades, morphological as well as molecular evidence has accumulated showing that in fact the majority of the species are better accommodated within *Urochloa* (see notably Webster 1987, 1988, Morrone & Zuloaga 1992, and Torres González & Morton 2005 and references therein). An exception could be made for three species: the widely distributed *Brachiaria eruciformis* (Sm.) Griseb., *B. malacodes* (Mez & K.Schum.) Scholz and *B. schoenfelderi* C.E.Hubb. & Schweick from Zimbabwe, Angola and Namibia, respectively. Unfortunately, because of a typification issue,

the name *Brachiaria* could not be maintained for this small group of species. A proposal to conserve the name by Veldkamp (1996) was rejected (Brummitt 1998), reason for Veldkamp (2004) to, reluctantly, erect the new genus *Moorochloa* Veldk. to accommodate these species.

Although the merger of the majority of *Brachiaria* with *Urochloa* has found support from experts working on South American, Asian and Australian grasses, African grass specialists seem to have been reluctant to accept it. As a result, many of the African *Brachiaria* species have no name available in *Urochloa* yet. Below, these are provided for those occurring in the Central African region, along with several taxonomic remarks. Although above I argue the necessary name changes of almost all African *Brachiaria* species, it seemed unwise to provide new combinations in *Urochloa* for the ones not occurring in Central Africa of which I did not study the taxonomy in detail.

*Urochloa arrecta* (Hack. ex T.Durand & Schinz) Morrone & Zuloaga (Morrone & Zuloaga 1992: 69). – *Panicum arrectum* Hack. ex T.Durand & Schinz (Durand & Schinz 1895: 741). – *Brachiaria arrecta* (Hack. ex T.Durand & Schinz) Stent (Stent 1924: 263). – Lectotype (**designated here**): South Africa, Komgha D., near Kei R., s.d., Drège s.n. (hololecto-: K, barcode K000282184).

*Panicum subquadruparum* auct. non Trin. (Nees von Esenbeck 1841: 29).

The basionym was based upon *Panicum subquadruparum* Nees, non Trin. Nees l.c., apparently misinterpreting the species indicated by Trinius (1826: 145), cited four syntypes: *Uitenhage* s.n., “ad flumen Zwartkoprivier circa praedium Pauli Marè” [Zwartkoprivier near Pauli Mare estate]; *Uitenhage* s.n., “in fosse iuxta sylvas Krakakammae” [in ditch near Krakakamma forest]; *Drège* s.n., “inter Assagaybosch et Botram” [between Assagaybosch and Botram]; *Drège* s.n., “udis altioribus ad flumen Key” [wet uplands of Key river]. The two *Uitenhage* specimens have not been located, but K holds a specimen of each of the *Drège* collections. The various annotations, amongst which the name *Panicum subquadruparum* in Nees’ hand, are more or less identical, but the sheet chosen to serve as the lectotype carries an analysis though of unknown origin. Both sheets clearly represent the species now known as *Urochloa arrecta*.

Specimens of the closely related *U. mutica* (Forssk.) T.Q.Nguyen may occasionally have only few paired spikelets in each raceme and can thus easily be confused with *U. arrecta*. The two seem sufficiently distinct based on additional characters of the rachis (0.5–1 mm wide in *U. mutica* and 1–1.5 in *U. arrecta*) and the culm nodes (densely bearded in *U. mutica* and glabrous to pubescent in *U. arrecta*).

### *Urochloa brevispicata* (Rendle) Sosef, **comb. nov.**

*Panicum brevispicatum* Rendle, Catalogue of the African plants collected by Dr. Friedrich Welwitsch in 1853–1861, vol. 2(1): 168. 1899 (Rendle 1899). – *Brachiaria brevispicata* (Rendle) Stapf (Stapf 1919: 521). – Type: Angola, between Condo and Quisonde, Mar. 1857, *Welwitsch* 2829 (lecto-: BM; isolecto-: K, LISU, MPU).

Although Rendle provides two syntypes, *Welwitsch* 2726 and 2829, Stapf (1919) distinctly chose the latter arguing that the first belonged to a different taxon. As such, Stapf effectively lectotypified the name with *Welwitsch* 2829.

*Urochloa brizantha* (Hochst. ex A.Rich.) R.D.Webster (Webster 1987: 233). – *Panicum brizanthum* Hochst. ex A.Rich. (Richard 1850: 363). – Type: Abyssinia, plantae Adoënses, s.d., *Schimper* 89 (lecto-: P; isolecto-: B?, BM, BR, G, GOET, K, L, LG, M, MO, MPU, PRE, TUB).

*Brachiaria gangangalaensis* Vanderyst (Vanderyst 1919: 243, nom. prov. inval.; 1925: 664–665). – Type: DRC, Jardin agrost. Leveville, Jan. 1919, *Vanderyst* 5000<sup>4</sup> (lecto-: BR, **designated here**; isolecto-: BR (2)).

Vanderyst (1919) first published the name *Brachiaria gangangalaensis*, along with many others, as a provisional name for this taxon, and as such it is invalid. However, in 1925, he published his account on the Paniceae, in which several of the provisional names published previously were included, thus validating them. He indicated three syntypes, one of which (the only one with a collection number) is chosen here to serve as lectotype.

*Urochloa clavipila* (Chiov.) Sosef, **comb. nov.**

*Panicum clavipilum* Chiov., *Annali di Botanica* 13: 43. 1914 (Chiovenda 1914). – *Brachiaria clavipila* (Chiov.) Robyns (Robyns 1932: 179). – Type: DRC, Kayoyo, s.d., *Bovone* 71 (holo-: TO).

*Urochloa comata* (Hochst. ex A.Rich.) Sosef (Sosef 1999: 64). – *Panicum comatum* Hochst. ex A.Rich. (Richard 1850: 376). – *Brachiaria comata* (Hochst. ex A.Rich.) Stapf (Stapf 1919: 561). – Type: Ethiopia, prope Gafta, s.d., *Schimper* 1196 (lecto-: P, **designated here**; isolecto-: BM, BR, E, G, GOET, K, LG, M, MO, MPU, W).

*Panicum scalare* Mez (Mez 1904: 138), *non* Schweinf. (Schweinfurth 1894). – *Brachiaria scalaris* Pilg. (Pilger 1928: 269). – Type: Tanzania, Kilimanscharo, Moshio Distr., Marangu, s.d., *Volkens* 657 (holo-: B, lost?; iso-: BR, K, JE), **synon. nov.**

*Brachiaria pilgerana* Scholz (Scholz 1978: 385), **nom. superfl.** – Type: as for *Panicum scalare* Mez.

*Brachiaria coronifera* Pilg. (Pilger 1936: 262). – Type: Tanzania, Njombe District, Likanga, s.d., *Schlieben* 439 (holo-: B; iso-: HBG, K, LISC, MO, PRE, US, WIS), **synon. nov.**

In the protologue of *Panicum comatum*, Richard (1850: 376) cited two collections, *Quartin Dillon* s.n. and *Schimper* 1196, both from Ethiopia. The latter has been chosen here as lectotype, because it has many more duplicates and is therefore much wider distributed and more easy to consult in the future. It concerns a form with upper glumes and lower lemmas carrying a horizontal line of long white hairs at about ¾ from the base. This form seems to be much more common in eastern Africa.

The name *Panicum scalare* Mez is to be regarded as a later homonym of *Panicum scalarum* Schweinf., and as such is illegitimate according to the ICBN (McNeill et al. 2012). Scholz (1978) argued that the name was therefore not avail-

able for a combination within *Brachiaria*, and hence that *B. scalaris* Pilg. was illegitimate, and proposed the new name *B. pilgerana*. However, Art. 58.1 of the ICBN (McNeill et al. 2012) is clear in stating that a later homonym is available for re-use in a new combination, but that the author of the later homonym is not referred to in the new combination and that the name has priority only from the publication date of the new combination. This renders *B. pilgerana* superfluous.

*Urochloa comata* has generally been keyed out by the fact that its spikelets are born in fascicles or even on short side-branches along the raceme. However, various grass publications (for example Clayton 1989, Clayton & Renvoize 1982, Phillips 1995) state that occasionally such structures are also present in the closely related *Brachiaria scalaris*, though only at the base of the lower racemes. After careful examination, I have observed the spikelet structure of the two taxa to be quite the same, and reached the conclusion that the latter is to be regarded as a poor form of *U. comata*. Similarly, *Brachiaria coronifera*, of which the distinction from *B. scalaris* was already doubted by for example Clayton & Renvoize (1982: 596), turned out to represent similar poor forms, but with a horizontal line of hairs below the top of the spikelet (like in the type of *U. comata*, see above). This rather wide variation in spikelet indumentum is known to occur in several species of this group though. A paratype specimen of *B. coronifera* at BR (*Schlieben* 768) even represents a mixture of both forms. For further information, see below in the discussion following *U. villosa*.

*Urochloa dictyoneura* (Fig. & De Not.) Veldkamp (Veldkamp 1996: 418). – *Panicum dictyoneurum* Fig. & De Not. (Figari & De Notaris 1854: 329). – *Brachiaria dictyoneura* (Fig. & De Not.) Stapf (Stapf 1919: 512). – Type: Soudan, Kordofan, Fazogl, s.d., *Figari* s.n. (holo-: FI).

*Panicum golae* Chiov. (Chiovenda 1914: 43). – Type: DRC, Catanga, Kayoyo, 20 Dec. 1911, *Bovone* 87 (holo-: FI).

*Panicum humidicola* Rendle (Rendle 1899: 169). – *Brachiaria humidicola* (Rendle) Schweick. (Hubbard et al. 1936: 297). – *Urochloa humidicola* (Rendle) Morrone & Zuloaga (Morrone & Zuloaga 1992: 80). – *Brachiaria dictyoneura* (Fig. & De Not.) Stapf subsp. *humidicola* (Rendle) Catasús (Catasús Guerra 2001: 16). – Type: Angola, Monino riv., s.d., *Welwitsch* 2678 (holo-: LISU; iso-: K).

Many authors have treated *U. humidicola* as a species distinct from *U. dictyoneura*, based on the fact that the first would be a stoloniferous (not tufted) plant, with only 2 or 3 racemes, smaller spikelets (3.8–5(–5.2) mm long) and leaves lacking a contra-ligule. After a careful study of the Central African specimens, I concluded that this distinction does not hold. Several specimens in fact show that stolons grow out of a fairly dense tuft, while the other characters show a continuum and hence overlap between the two taxa. I therefore follow Veldkamp (1996) who already united the two. Chromosome counts for *U. dictyoneura* s.s. of  $2n = 42$  and for *U. humidicola* of  $2n = 72$  have been published (Schultze-Kraft 1992, Schultze-Kraft & Teitzel 1992) suggesting that a polyploid complex may be at hand.

*Urochloa distachya* (L.) T.Q.Nguyen (Nguyen 1966: 1). – *Panicum distachyon* L. (Linné 1771: 183). – *Brachiaria distachya* (L.) Stapf (Stapf 1919: 565). – Type: Herb. Linn. No. 80.41 (lecto-: LINN).

*Panicum miliiforme* J.Presl & C.Presl (Presl 1830: 300). – *Brachiaria miliiforme* (J.Presl & C.Presl) Chase (Chase 1920: 35). – Type: Philippines, Luzon, s.d., *Haenke* s.n. (holo-: PR; iso-: B, HAL, W).

*Panicum subquadruparum* Trin. (Trinius 1826: 145). – *Brachiaria subquadrupara* (Trin.) Hitchc. (Hitchcock 1931: 214). – *Urochloa subquadrupara* (Trin.) R.D.Webster (Webster 1987: 252). – Type: Marianne Islands, Guam, s.d., *Chamisso* in Hb. Trinius 0974.01 (lecto-: LE).

In the past, the distinction between *B. distachya*, *B. miliiforme* and *B. subquadrupara* has been discussed several times, for example by Henrard (1950), Jansen (1953) and Clayton & Renvoize (1982). These authors all agree that two species can be recognized: *B. distachya* with more plump spikelets, broadest above the middle, of 2.4–2.8(–3) mm long, and *B. subquadrupara* (with *B. miliiforme* as its synonym) with more slender spikelets, broadest at the middle, of (3.3–)3.5–3.7(–4.0) mm long. Several other features are mentioned (peduncle pilose or glabrous near the top, difference in length of the lower glume, ecology), but none of the latter characters seem to hold, as in fact already nicely explained by Henrard (1950). The latter provided two fine drawings of the spikelets (Henrard 1950: 191–192) and stated their difference is “striking”, reason to keep the species apart. While studying the Central African material, as well as that available at BR from other areas and continents, I soon found out that the ‘striking’ differences represent in fact two extremes of an almost continuous grade. The two types could even be found within a single collection. The best option seems to recognize only a single species, as did Morrone & Zuloaga (1992), although they provided no arguments as to why they so did. The observed variation might be linked with the different chromosome numbers found ( $2n = 36, 54$  or  $72$ ) and thus be caused by the presence of a polyploid complex.

*Urochloa distachyoides* (Stapf) Sosef, **comb. nov.**

*Brachiaria distachyoides* Stapf, Order CLVII. Gramineae, part 3. In: Prain D. (ed.) Flora of Tropical Africa, vol. IX: 530. 1919 (Stapf 1919). – Type: Nigeria, Lagos, s.d., *Dawodu* 163 (holo-: K; iso-: B, BM, BR, K, L, US, W).

This is a rare species occurring from Sierra Leone to the northern part of the DRC and occurs in muddy places along swamps and small rivers.

*Urochloa eminii* (Mez) Davidse (Davidse & Brako 1993: 1258). – *Panicum eminii* Mez (Mez 1904: 135, “*Eminii*”). – Type: Tanzania, Muansa, May 1892, *Stuhlmann* 4663 (lecto-: B; isolecto-: BR, K).

*Brachiaria decumbens* Stapf (Stapf 1919: 528). – *Urochloa decumbens* (Stapf) R.D.Webster (Webster 1987: 234). – Type: Uganda, Mengo Distr., s.d., *Dummer* 1070 (lecto-: K (**designated here**); isolecto-: BM, BOL, BR, PRE), **synon. nov.**

*Brachiaria bequaertii* Robyns (Robyns 1932: 177). – Type: DRC, Mboga, 17 Mar. 1914, *Bequaert* 3033 (holo-: BR).

*Brachiaria ruziziensis* R.Germ. & C.M.Evrard (Germain & Evrard 1953: 373). – *Brachiaria decumbens* Stapf var. *ruziziensis* (R.Germ. & C.M.Evrard) Ndabaneze (Ndabaneze 1989: 16). – *Urochloa ruziziensis* (R.Germ. & C.M.Evrard) Crins (Crins 1991: 269). – Type: DRC, Plaine de la Ruzizi, Tsimuka, Feb. 1950, *Germain* 6214 (holo-: BR; iso-: EA, YBI), **synon. nov.**

Most recent authors have distinguished three closely related species: *U. eminii*, *U. decumbens* and *U. ruziziensis*. All possess a winged rachis with ciliate margins, a clasping lower glume concealing a short internode between the lower and upper glume, and more or less pubescent (rarely even glabrous) spikelets. *U. ruziziensis* was described (as *Brachiaria ruziziensis*) indicating that the main difference between this species and *U. eminii* would be the presence of a short internode between the lower and upper glume which *U. eminii* would lack. This clearly is an erroneous observation, since *U. eminii* also possesses such an internode (also verified on the isotype at BR). Then, the taxon *U. decumbens* was already treated as being conspecific with *U. eminii* by Robyns (1934), but subsequent authors (notably the authoritative Clayton & Renvoize 1982) kept it distinct, based on the fact that *U. eminii* would be a tufted annual with lower glumes more than  $\frac{1}{2}$  the length of the spikelet while *U. decumbens* would be a stoloniferous perennial with lower glumes less than  $\frac{1}{2}$  as long as the spikelet. Kami (1997), in his treatment of the grasses of the Republic of the Congo, and Morrone & Zuloaga (1992) in their overview of South-American species of *Brachiaria* and *Urochloa*, distinguished *U. decumbens* and *U. ruziziensis* based on their resp. perennial and annual habit and the presence/absence of a well-developed terminal spikelet. Furthermore, these authors indicate that the rachis width is distinctive: in *U. decumbens* it is 1–1.7 mm, in *U. eminii* 2–3 mm and in *U. ruziziensis* 3–5 mm. In his Catalogue of Burundi grasses, Ndabaneze (1989) reduced *U. ruziziensis* to a variety of *U. decumbens*, unfortunately without any argumentation. Troupin (1988) stated that Ndabaneze’s decision was based on the presence of intermediate specimens. Finally, Clayton & Renvoize (1982) noted that *U. ruziziensis* could well be nothing more than a local segregate of *U. decumbens*.

Upon closer study of the fairly abundant material available at BR, I came to the conclusion that none of the characters above hold. An apparently annual habit can be observed, but this is not correlated with any of the other characters, and could simply relate to the specific plant being young. Stolons (basically prostrate culms rooting at the nodes) are very frequently occurring, also in seemingly annual plant material. The length of the lower glume is variable, but again, does not seem to have any correlation with for example rachis width. In conclusion, it is best to regard these names as referring to a single, though variable, species.

Occasionally, some specimens have glabrous spikelets (a form described as *B. bequaertii*) although in that case sparsely pubescent spikelets were sometimes observed on the same plant, confirming that this falls within the variability of this species. The distinction with the related *U. rugulosa* (see be-

low) becomes difficult, but can be established based on the much more rugose lemma of the upper floret, the generally shorter lower glume with only 5 or 7 veins (not 9 to 13), and the upright or shortly ascending culms of the latter. Forms with glabrous spikelets may then also be difficult to distinguish from *U. brizantha* (Hochst. ex A.Rich.) R.D.Webster, especially since in such specimens the spikelets tend to be paler in colour and often tinged with purple, typical for *U. brizantha*. The latter can be distinguished based on its more plump spikelets in a single row, with blunt and incurved apices of both lemmas. It is not impossible that such 'intermediate' specimens in fact represent hybrids between the two.

In the protologue of *B. decumbens*, Stapf (1919) mentioned two specimens: *Dummer* 1070 and *Speke & Grant* 488. Both are present at K, but the first has several duplicates elsewhere and is therefore selected as the lectotype.

***Urochloa reticulata* (Stapf) Sosef, comb. nov.**

*Brachiaria reticulata* Stapf, Order CLVII. Gramineae, part 3. In: Prain D. (ed.) Flora of Tropical Africa, vol. IX: 522. 1919 (Stapf 1919). – Type: DRC, Kitebe, Mar. 1914, *Vanderyst* 3687 (lecto-: K, **designated here**; isolecto-: BR).

*Brachiaria nana* Vanderyst (Vanderyst 1919: 244), non Stapf (1916: 264), **nom. illegit.**

Stapf (1919) provided five syntypes, all collected by Vanderyst in roughly the same region ("Stanley Pool District", now Mai-Ndombe District). From amongst these, we have chosen *Vanderyst* 3687, because the Kew duplicate bears an analysis made by Stapf. Moreover, it represents a rich collection, with a duplicate at BR. Furthermore, the BR specimen also bears the (illegitimate) name *Brachiaria nana* in Vanderyst's handwriting. Although that name does not need to be typified, it does establish a firm link between the two names and thus confusion as to the identity of *B. nana*.

***Urochloa rugulosa* (Stapf) Sosef, comb. nov.**

*Brachiaria rugulosa* Stapf, Order CLVII. Gramineae, part 3. In: Prain D. (ed.) Flora of Tropical Africa, vol. IX: 529. 1919 (Stapf 1919). – Type: Kenya, Nairobi, Mar. 1902, *Lyne* 154 (lecto-: K, **designated here**).

Stapf (1919) cited two syntypes, *Lyne* 154 and *Dowson* 257 (partly), both collected in Kenya near Nairobi. Since the latter appears to be a mixture, it is preferable to choose the first as the lectotype.

***Urochloa serrata* (Thunb.) Sosef, comb. nov.**

*Holcus serratus* Thunb., Prodrum plantarum capensium, quas in Promontorio Bonae Spei Africes, annis 1772–1775, collegit Carol. Pet. Thunberg: 20. 1794 (Thunberg 1794). – *Brachiaria serrata* (Thunb.) Stapf (Stapf 1919: 537). – Type: South Africa, Cap. bon. sp., s.d., *Thunberg* s.n. (holo-: UPS; iso-: LD, M, SBT).

***Urochloa semiundulata* (Hochst. ex A.Rich.) Ashalantha & V.J.Nair (Ashalantha & Nair 1997: 30). – *Panicum semiundulatum* Hochst. ex. A.Rich. (Richard 1850: 364). – *Brachi-***

*aria semiundulata* (Hochst. ex A.Rich.) Stapf (Stapf 1919: 556). – Type: Ethiopia, Adoam, *Schimper* 289 (lecto-: P, **designated here**; isolecto-: BM, BR, GOET, K, L, LG, M, MO, MPU, S, W, WAG).

The protologue cited two collections, *Schimper* 289 from Aduoa and *Schimper* 1833 from Chiré. Duplicates of both collections are available in many herbaria and represent ample material of the same species. Thus, without any clear reason for a preference, the specimen cited first in the protologue was chosen as the lectotype.

This species is difficult to distinguish from poor forms of *U. comata* (formerly accommodated in *Brachiaria scalaris*) and from *U. villosa*. It differs from both in the shape of its spikelets, which is broadly obovate, its culm nodes which carry a dense tuft of spreading grey hairs and its lower glume being not clasping and surrounding the spikelet base for only about ⅓. In *U. comata* the lower glume is also not clasping, but its line of insertion surrounds the entire spikelet. In *U. villosa* the lower glume is clasping, hence with the lower margins running vertical for a short distance after spreading out and there is a (very) short rachilla between lower and upper glume.

***Urochloa trichopus* (Hochst.) Stapf (Stapf 1920: 589). – *Panicum trichopus* Hochst. (Hochstetter 1844: 254). – Type: Soudan, Kordofan, s.d., *Kotschy* 74 (holo-: TUB; iso-: BM, G, K, MO, S, W).**

*Urochloa mosambicensis* (Hack.) Dandy (Dandy 1931: 54). – *Panicum mosambicense* Hack. (Hackel 1888: 140). – *Urochloa pullulans* Stapf var. *mosambicensis* (Hack.) Stapf (Stapf 1920: 592). – Type: Mozambique, s.d., *de Carvalho* 19 (holo-: W; iso-: COI, K, US), **synon. nov.**

*Urochloa pullulans* Stapf (Stapf 1920: 590), **nom. superfl., synonym. nov.**

*Urochloa rhodesiensis* Stent. (Stent & Ratray 1933: 26). – Type: Zimbabwe, Salisbury, grass plots, 22 Feb. 1932, *Stent* 5547 (lecto-: SRGH, **designated here**; isolecto-: K, PRE), **synon. nov.**

*Urochloa stolonifera* (Goossens) Chipp. (Chippindall 1955: 381). – *Brachiaria stolonifera* Goossens (Goossens 1934: 195). – Type: South Africa, Cape Province, Gordonias Distr., along Molopo River, 27 Dec. 1929, *Pole Evans & Pentz* 8327 (holo-: PRE), **synon. nov.**

In the past, the majority of authors made a distinction at species level between the perennial and annual form, naming them *U. mosambicensis* and *U. trichopus* respectively. However, I could not trace any additional morphological feature to support such a taxonomic distinction. In addition, the similar and large variation in pilosity of the spikelets being present in both forms corroborates the idea that a single species is at hand. Life form, although important from the viewpoint of cultivation (the species is traded and is a palatable pasture grass, see Brink 2006a, 2006b), can in itself not serve as the only diagnostic feature at species level. Reason why these taxa are synonymized here.

Meanwhile, although *U. trichopus* is widespread in tropical Africa and east to Yemen and Birma, it was never reported from Central Africa. Recently, a wrongly identified



specimen collected in 1954 in Haut-Katanga (south-eastern DRC) at BR turned out to represent the first record from this region: *van Oosten* 240.

The protologue of *Urochloa rhodesiensis* mentioned four syntypes, *Stent* (in S.R.G.H.) 3669, 4516, 5547 and *Rattray* 500. Since at that time *Stent* and *Rattray*, the authors of the article in which this name was published, both worked at Salisbury (now Harare) in Rhodesia (now Zimbabwe), the holotype should be sought at SRGH. The material, as observed via JSTOR (2000–2016), is quite uniform. It is uncertain whether *Rattray* 500 is present in SRGH, and *Stent* 5547 having most duplicates elsewhere (according to JSTOR 2000–2016), this collection was chosen as the lectotype.

***Urochloa turbinata* (Van der Veken) Sosef, comb. nov.**

*Brachiaria turbinata* Van der Veken, Bulletin du Jardin Botanique de l'État, Bruxelles 28: 77 (Van der Veken 1958). – Type: DRC, Haut-Katanga, Kiubo, au sud des chutes de la Lufira, 27 Jan. 1954, *Van Oosten* 236 (holo-: BR; iso-: BR).

This narrowly endemic species occurs only in the Haut-Katanga region of the DRC. It is closely related to *U. serrata*, but characterized by its annual habit, lanceolate to narrowly elliptic leaf blades, turbinate spikelets, distinctly asymmetric and ligulate pedicel tip and long hairs on the pedicels extending well beyond the spikelet. Several collections from near Kolwezi represent a perennial form with narrower leaf blades. Others from the same region show less turbinate spikelets and less characteristic long hairs on the pedicels. Further study is needed to assess the taxonomic status of these forms and, eventually, this species.

***Urochloa villosa* (Lam.) T.Q.Nguyen (Nguyen 1966: 14).** – *Panicum villosum* Lam. (Lamarck 1791: 173). – *Brachiaria villosa* (Lam.) A.Camus (Camus & Camus 1922: 433). – Type: Inde, s.d., *Sonnerat* s.n. (holo-: P).

*Panicum distichophyllum* Trin. (Trinius 1826: 147). – *Brachiaria distichophylla* (Trin.) Stapf (Stapf 1919: 557). – Type: Ghana, Accra, s.d., *Sabine* s.n. (holo-: LE).

Clayton & Renvoize (1982) already remarked the close resemblance between what was then called *Brachiaria villosa* and *B. scalaris* by stating “*B. scalaris* replaces *B. villosa* in eastern Africa, differing in little more than the smaller spikelet size”. Phillips (1995: 227) came to the same conclusion, but added that the spikelets of *B. villosa* are more sharply acute.

Above, in the discussion following *U. comata*, it has been explained that *B. scalaris* is to be regarded as a poor form of *U. comata*. Indeed, the distinction between such poor forms and *U. villosa* is quite difficult. After careful examination of all material available at BR (several hundred sheets), including type material of *B. scalaris*, as well as that available through the JSTOR Global Plants website (<http://plants.jstor.org>), I have observed that the only difference between the two species seems to be the clasping lower glume in *U. villosa* (with its lower margins running vertical and touching each other or even slightly overlapping), where it is not clasping in *U. comata* (margins diverging right from the base). In *U. comata* the lower floret can be male or sterile, while in *U. vil-*

*losa* it is always sterile. Spikelets from both species can have a rounded or acute apex.

***Urochloa wittei* (Robyns) Sosef, comb. nov.**

*Brachiaria wittei* Robyns, Bulletin du Jardin Botanique de l'État à Bruxelles 9(3): 180. 1932 (Robyns 1932). – Type: DRC, Kiambi, Apr. 1931, *de Witte* 238 (holo-: BR; iso-: BR, US).

***Urochloa xantholeuca* (Schinz) H.Scholz var. *leucacrantha* (K.Schum.) Sosef, comb. & stat. nov.**

*Panicum leucacranthum* K.Schum., Fam. Gramineae. In: Engler A. (ed.) Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete. Teil C. Verzeichniss der bis jetzt aus Ost-Afrika bekannt gewordenen Pflanzen: 102. 1895 (Schumann 1895). – *Brachiaria leucacrantha* (K.Schum.) Stapf (Stapf 1919: 540). – Type: Tanzania, Amboni, 14 Jan. 1893, *Holst* 2805 (lecto-: B, designated here; isolecto-: K, M).

The species *Brachiaria leucacrantha* was already suspected to represent not more than a form of *Urochloa* (*Brachiaria*) *xantholeuca* by Clayton & Renvoize (1982: 597) and Clayton (1989: 78). After studying the material at BR, I reach the same conclusion. The spikelets of *B. leucacrantha* are more strongly acuminate than those of *U. xantholeuca* and carry two tufts of long hairs on the upper glume and lower lemma. However, slightly less acuminate spikelets sometimes already show this tendency to have longer hairs towards the tip as well, and one may even argue to synonymize both taxa. Because the *leucacrantha*-form seems to be restricted to eastern Africa, while *U. xantholeuca* occurs throughout tropical Africa, it is deemed best to assign it some taxonomic status, for which the variety level seems most appropriate.

The protologue of the name *Panicum leucacranthum* provides three syntypes: *Holst* 2077 (which could be an error for 2097), 2805 and 4163. In B, *Holst* 2097 holds a copy of the protologue (and drawing of spikelet details of later date), but that cites #2077, giving rise to some confusion or doubt. The collection numbered 4163 does not have an original label from *Holst*. *Holst* 2805 being by far the richest material at B, with an original label, and the only one with known duplicates elsewhere (at least K and M), then seems to be the obvious choice for the lectotype.

## ACKNOWLEDGMENTS

I am grateful to the curators of the following herbaria, for providing access to their collections and/or assisting in tracing specific materials: BRLU, GENT, LG, MOD, WAG.

## REFERENCES

- Ashalantha V.N., Nair V.J. (1997) *Brachiaria* Griseb. and *Urochloa* P.Beauv. (Poaceae) in India – A conspectus. Bulletin of the Botanical Survey of India 35: 27–31.
- Brink M. (2006a) *Urochloa mosambicensis* (Hack.) Dandy. In: Brink M., Belay G. (eds) Ressources végétales de l'Afrique tropicale 1. Céréales et légumes secs: 216–217. Wageningen, Fondation PROTA / Backhuys Publishers / CTA.

- Brink M. (2006b) *Urochloa trichopus* (Hochst.) Stapf. In: Brink M., Belay G. (eds) *Ressources végétales de l'Afrique tropicale 1. Céréales et légumes secs*: 218–219. Wageningen, Fondation PROTA / Backhuys Publishers / CTA.
- Brown R. (1818) Observations, systematical and geographical, on the herbarium collected by Professor Christian Smith, in the vicinity of the Congo, during the expedition to explore that river, under the command of Captain Tuckey, in the year 1816. In: Tuckey J.K., Smith C. (eds) *Narrative of an expedition to explore the River Zaïre*: 420–485. London, John Murray.
- Brummitt R.K. (1998) Report of the Committee for Spermatophyta: 47. *Taxon* 97: 863–870. <http://dx.doi.org/10.2307/1224194>
- Camus E.G., Camus A. (1922) Graminées. In: Gagnepain F. (ed.) *Flore Générale de l'Indo-Chine*, vol. 7: 202–650. Paris, Masson et Cie.
- Chase A. (1920) The North American species of *Brachiaria*. *Contributions from the United States National Herbarium* 22: 33–43.
- Catasús Guerra L. (2001) De poaceis cubensibus notulae, III (in floram novam cubensem stydia intendentia). *Fontqueria* 55(4): 15–17.
- Chiovenda E. (1914) Gramina nova ex Catanga (Africa tropica meridionalis). *Annali di Botanica* 13: 35–58.
- Chiovenda E. (1923) Le piante raccolte dal Dott. Ettore Bovone al Catanga nel 1918–21. *Nuovo Giornale Botanico Italiano*, nuova serie 29: 105–119.
- Chippindall L.K.A. (1955) A guide to the identification of grasses in South Africa. In: Meredith D. (ed.) *The grasses and pastures of South Africa*: 7–527. Johannesburg, Central News Agency.
- Clayton W.D. (1970) Gramineae, part 1. In: Milne-Redhead E., Polhill R.M. (eds) *Flora of Tropical East Africa*. London, Crown Agents for Oversea Governments and Administrations.
- Clayton W.D., Phillips S.M., Renvoize S.A. (1974) Gramineae, part 2. In: Polhill R.M. (ed.) *Flora of Tropical East Africa*. London, Crown Agents for Oversea Governments and Administrations.
- Clayton W.D. (1975) The *Paspalum scrobiculatum* complex in tropical Africa: studies in the Gramineae: XXXVIII. *Kew Bulletin* 30: 101–105. <http://dx.doi.org/10.2307/4102877>
- Clayton W.D., Renvoize S.A. (1982) Gramineae (Part 3). In: Polhill R.M. (ed.) *Flora of Tropical East Africa*. Rotterdam, A.A. Balkema.
- Clayton W.D., Renvoize S.A. (1986) Genera Graminum, Grasses of the World. *Kew Bulletin Additional Series* 13. London, Royal Botanic Gardens, Kew.
- Clayton W.D. (1989) Gramineae. XXIV. Paniceae. In: Launert E., Pope G.V. (eds) *Flora Zambesiaca* vol. 10 part 3: 1–192. London, Flora Zambesiaca Managing Committee.
- Clayton W.D., Vorontsova M.S., Harman K.T., Williamson H. (2006 onwards) GrassBase - The Online World Grass Flora. Available from <http://www.kew.org/data/grasses-db.html> [accessed 27 Aug. 2015].
- Cope T. (1999) Arundineae, Eragrostideae, Leptureae and Cynodonteae. In: Pope G.V. (ed.) *Flora Zambesiaca* vol. 10 part 2: 1–261. London, Royal Botanic Gardens, Kew.
- Cope T. (2002) XXVII. Andropogoneae Dumort. In: Pope G.V., Martins E.S. (eds) *Flora Zambesiaca* vol. 10 part 4: 1–190. London, Royal Botanic Gardens, Kew.
- Crins W.J. (1991) The genera of Paniceae (Gramineae: Panicoideae). *Journal of the Arnold Arboretum, Supplementary Series* 1: 171–312.
- Dandy J.E. (1931) Some new names in the Monocotyledones - I. *Journal of Botany, British and Foreign* 69: 53–55.
- Davidse G., Brako L. (1993) Poaceae. In: Brako L., Zarucchi J.L. (eds) *Catalogue of the flowering plants and gymnosperms of Peru. Monographs in Systematic Botany from the Missouri Botanical Garden* 45: 926–977, 1257–1258.
- de Lamarck J.B.A.P.M. (1791) *Tableau encyclopédique et méthodique des trois règnes de la nature. Botanique*, tome 1, volume 1(1). Paris, Pancoucke.
- de Vogel E.F. (1987) *Manual of herbarium taxonomy: theory and practice*. Jakarta, UNESCO.
- Durand T., Durand H. (1909) *Sylloge Florae Congolanae (Phanerogamae)*. Bruxelles, Maison Albert De Boeck. <http://dx.doi.org/10.5962/bhl.title.10918>
- Durand T., Schinz H. (1895) *Conspectus Florae Africae ou énumération des plantes d'Afrique*, vol. V. Bruxelles, Jardin Botanique de l'État. <http://dx.doi.org/10.5962/bhl.title.1459>
- Figari A., De Notaris J. (1854) *Agrostographiae Aegyptiacae fragmenta. Memoria della Reale Accademia delle Scienze di Torino*, ser. 2, 14(2): 317–391.
- Franchet M.A. (1895) Contribution à la Flore du Congo français - Famille des Graminées. *Bulletin de la Société d'Histoire Naturelle d'Autun* 8: 309–391.
- Germain R., Evrard C.M. (1953) Un nouveau *Brachiaria* de l'est du Congo Belge. *Bulletin du Jardin Botanique de l'État à Bruxelles* 23: 373–377. <http://dx.doi.org/10.2307/3666934>
- Goossens A.P. (1934) Notes on African grasses: XVI. *Bulletin of Miscellaneous Information Kew* 1934: 195–202. <http://dx.doi.org/10.2307/4111662>
- Hackel E. (1888) *Plantae in Zambezia a cl. M. Rodrigues de Carvalho anno 1880 lectae*, Gramineae. *Boletim da Sociedade Broteriana* 6: 140–143.
- Harker K.W. (1960) *An illustrated guide to the grasses of Uganda*. Entebbe, The Government Printer.
- Henrard J.Th. (1950) *Monograph of the genus Digitaria*. Leiden, Universitaire Pers Leiden.
- Hitchcock A.S. (1931) Grasses of Canton and vicinity. *Lingnan Science Journal* 7: 177–265.
- Hochstetter C.F. (1844) Gramina nova Afrikana. *Flora* 27(16): 241–254.
- Hubbard C.E., Schweickerdt H.G., Snowden J.D. (1936) Notes on African grasses: XIX. *Miscellaneous notes and new species. Kew Bulletin of Miscellaneous Information* 1936: 293–335. <http://dx.doi.org/10.2307/4111703>
- Jansen P. (1953) Notes on Malaysian grasses - I. *Reinwardtia* 2: 225–350.
- JSTOR (2000–2016) *Global Plants*. Available from <http://plants.jstor.org> [accessed 15 Dec. 2015].
- Kami E. (1997) Analyse floristique et phytogéographique des Graminées (Poaceae) du Congo-Brazzaville. PhD thesis, Université Libre de Bruxelles, Brussels, Belgium.
- Koechlin J. (1962) Graminées. *Flore du Gabon*, vol. 5. Paris, Muséum national d'Histoire naturelle.
- Koning R., Sosef M.S.M. (1985) The Malesian species of *Paspalum* L. (Gramineae). *Blumea* 30: 279–318.
- Launert E. (1971) Gramineae (Bambuseae-Pappophoreae). In: Fernandes A., Launert E., Wild H. (eds) *Flora Zambesiaca* vol. 10 part1: 1–152. London, Crown Agents for Oversea Governments and Administrations.
- Léonard J. (1994) Statistiques des Spermatophytes de la Flore d'Afrique centrale. *Bulletin du Jardin botanique National de Belgique* 63: 181–194. <http://dx.doi.org/10.2307/3668475>



- McNeill J., Barrie F.R., Buck W.R., Demoulin V., Greuter W., Hawksworth D.L., Herendeen P.S., Knapp S., Marhold K., Prado J., Prud'homme van Reine W.F., Smith G.F., Wiersema J.H., Turland N.J. (2012) International Code of Nomenclature for algae, fungi, and plants (Melbourne Code). Regnum Vegetabile 154. Koenigstein, Koeltz Scientific Books.
- Mez C.C. (1904) Gramineae Africae V. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 34: 131–148.
- Morrone O., Zuloaga F.O. (1992) Revisión de las especies sudamericanas nativas e introducidas de los géneros *Brachiaria* y *Urochloa* (Poaceae: Panicoideae: Paniceae). Darwiniana 31: 43–109.
- Napper D.M. (1965) Grasses of Tanganyika. Ministry of Agriculture, Forests and Wildlife, Tanzania, Bulletin No. 18. Dar es Salaam, The Government Printer.
- Ndabaneze P. (1989) Catalogue des Graminées du Burundi. Lejeunia n.s. 132: 1–127.
- Nees von Esenbeck C.G. (1841) Florae Africae Australioris illustrationes monographicae. Glogów, Prausnitz. <http://dx.doi.org/10.5962/bhl.title.7585>
- Nguyen T.Q. (1966) Notulae criticae de gramineis florae Vietnamensis, 1. Novitates Systematicae Plantarum Vascularium 1966: 10–14.
- Phillips S. (1995) Poaceae (Gramineae). In: Hedberg I., Edwards S. (eds) Flora of Ethiopia and Eritrea, volume 7: 1–420. Addis Ababa, The National Herbarium, Addis Ababa University & Uppsala, Dept. of Systematic Botany, Uppsala University.
- Pilger R.K.F. (1936) Neue und seltene Arten aus Ostafrika (Tanganyika-Territ. Mandat) leg. H.J. Schlieben, XI. Gramineae V. Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem 12: 260–264.
- Presl C.B. (1830) Reliquiae haenkeanae seu descriptiones et icones plantarum, quas in America meridionali et boreali, in insulis Philippinis et Marianis collegit Thaddeus Haenke, redegit et in ordinem digessit Carolus Bor. Presl. Prague, J.G. Calve. <http://dx.doi.org/10.5962/bhl.title.515>
- Rendle A.B. (1899) Catalogue of the African plants collected by Dr. Friedrich Welwitsch in 1853–1861, vol. 2(1). London, Hazell, Watson & Viney Ltd.
- Richard A. (1850) Tentamen florae abyssinicae eu, Enumeratio plantarum hucusque in plerisque Abyssiniae provinciis detectarum et praecipue a beatis doctoribus Richardo Quartino Dillon et Antonio Petit (annis 1838–1843) lectarum / auctore Achille Richard. Vol. 2. Paris, Arthus Bertrand.
- Robyns W. (1929) Flore agrostologique du Congo belge et du Ruanda-Urundi, 1. Maydées et Andropogonées. Bruxelles, Goemaere.
- Robyns W. (1932) Contribution à l'étude des Graminées du Congo Belge et du Ruanda-Urundi. II. Panicées. Bulletin du Jardin Botanique de l'État à Bruxelles 9: 171–202. <http://dx.doi.org/10.2307/3666429>
- Robyns W. (1934) Flore agrostologique du Congo Belge et du Ruanda-Urundi, II. Panicées. Bruxelles, Goemaere.
- Robyns W. (1946) Statistiques de nos connaissances sur les Spermatophytes du Congo belge et du Ruanda-Urundi. Bulletin du Jardin Botanique de l'État, Bruxelles 18: 133–144. <http://dx.doi.org/10.2307/3666623>
- Robyns W. (1949) Les connaissances actuelles en botanique congolaise. Premier Rapport Annuel de l'I.R.S.A.C. 1948: 153–194. Bruxelles, Institut de la Recherche Scientifique en Afrique Centrale.
- Scholz H. (1978) Bemerkungen über Gramineen aus dem Berliner Herbar: *Brachiaria* und *Megalachne*. Willdenowia 8: 383–387.
- Schultze-Kraft R. (1992) *Brachiaria dictyoneura* (Fig. & De Not.) Stapf. In: 't Mannetje L., Jones R.M. (eds) Plant Resources of South-East Asia No 4. Forages: 60–61. Wageningen, Pudoc Scientific Publishers.
- Schultze-Kraft R., Teitzel J.K. (1992) *Brachiaria humicola* (Rendle) Schweick. In: 't Mannetje L., Jones R.M. (eds) Plant Resources of South-East Asia No 4. Forages: 62–64. Wageningen, Pudoc Scientific Publishers.
- Schumann K. (1895) Fam. Gramineae. In: Engler A. (ed.) Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete. Teil C. Verzeichniss der bis jetzt aus Ost-Afrika bekannt gewordenen Pflanzen: 95–117. Berlin, Dietrich Reimer.
- Schweinfurth G. (1894) Sammlungen arabisch-aethiopischer Pflanzen. Bulletin de l'Herbier Boissier 2, App. 2: 1–113.
- Soreng R.J., Peterson P.M., Romaschenko K., Davidse G., Zuloaga F.O., Judziewicz E.J., Filgueiras T.S., Davis J.I., Morrone O. (2015) A worldwide phylogenetic classification of the Poaceae (Gramineae). Journal of Systematics and Evolution 53: 117–137. <http://dx.doi.org/10.1111/jse.12150>
- Sosef M.S.M. (1999) Gramineae (Supplément). Flore du Gabon, vol. 5 bis. Paris, Muséum national d'Histoire naturelle.
- Sosef M.S.M. (2014) Revitalizing the Flore d'Afrique centrale. In: Consortium Congo 2010 (eds) The 1st International Conference on Biodiversity in the Congo Basin, Abstracts: 207. Kinshasa, Médiaspaul.
- Sosef M.S.M., Groom Q., Dessein S. (2014) Flore d'Afrique centrale: progress and e-developments. In: Bytebier B., Muasya A.M., Bellstedt D.U. (eds) Biodiversity of African plants – Challenges in a changing world. Abstracts of the XX<sup>th</sup> AETFAT Congress: 411. Scripta Botanica Belgica 52. National Botanic Garden of Belgium, Meise.
- Sosef M.S.M. (2016) Producing the Flore d'Afrique Centrale, past, present and future. Taxon 65: 937–939. <http://dx.doi.org/10.12705/654.54>
- Stapf O. (1916) Diagnoses Africanae: LXXII. Bulletin of Miscellaneous Information Kew 1919: 264–265. <http://dx.doi.org/10.2307/4111530>
- Stapf O. (1919) Order CLVII. Gramineae, part 3. In: Prain D. (ed.) Flora of Tropical Africa, vol. IX: 385–576. Ashford, L. Reeve & Co. Ltd.
- Stapf O. (1920) Order CLVII. Gramineae, part 4. In: Prain D. (ed.) Flora of Tropical Africa, vol. IX: 577–768. Ashford, L. Reeve & Co. Ltd.
- Stent S.M. (1924) South African Gramineae. Grasses of the Transvaal as represented in the National Herbarium. Bothalia 1: 222–303. <http://dx.doi.org/10.4102/abc.v1i4.1785>
- Stent S.M., Rattray J.M. (1933) The grasses of southern Rhodesia. Proceedings and Transactions of the Rhodesia Scientific Association 32: 1–64.
- Steudel E.G. (1854) Synopsis plantarum glumacearum. Vol. 1. Stuttgart, J.B. Metzler.
- Thiers B. (continuously updated) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from <http://sweetgum.nybg.org/ih/> [accessed 15 Jan. 2016].
- Thunberg C.P. (1794) Prodomus plantarum capensium, quas in Promontorio Bonae Spei Africes, annis 1772–1775, collegit Carol. Pet. Thunberg. Uppsala, Joh. Edman.
- Torres González A.M., Morton C.M. (2005) Molecular and morphological phylogenetic analysis of *Brachiaria* and *Urochloa*

- (Poaceae). *Molecular Phylogenetics and Evolution* 37: 36–44. <http://dx.doi.org/10.1016/j.ympev.2005.06.003>
- Trinius C.B. (1826) *De Graminibus paniceis*. St Petersburg, Academiae Imperialis Scientiarum.
- Troupin G. (1988) Poaceae. In: Troupin G. (ed.) *Flore du Rwanda, Spermatophytes*, Volume IV: 147–397. Musée Royal de l'Afrique Centrale - Tervuren, Belgique, Annales, série in-8°, Sciences Économiques 16. Agence de Coopération Culturelle et Technique.
- Van der Veken P. (1958) Une remarquable espèce nouvelle de *Brachiaria* (Gramineae). *Bulletin du Jardin Botanique de l'État, Bruxelles* 28: 77–81. <http://dx.doi.org/10.2307/3667020>
- Vanderyst H. (1918) *Prodrome d'Agrostologie agricole, Bas et Moyen-Congo Belge. Première partie (suite). Chapitre III. Énumération des Graminées du Bas et Moyen-Congo*. *Bulletin Agricole du Congo Belge* 9: 234–252.
- Vanderyst H. (1919) *Prodrome d'Agrostologie agricole, Bas et Moyen-Congo Belge. Première partie (suite). Chapitre III. Énumération des Graminées du Bas et Moyen-Congo*. *Bulletin Agricole du Congo Belge* 10: 241–250.
- Vanderyst H. (1925) *Aide-mémoire pour faciliter la recherche des Paniceae*. *Bulletin Agricole du Congo Belge* 16: 652–689.
- Vanderyst H. (1932) *Introduction à la phytogéographie agrostologique de la province Congo-Kasai - Les formations et associations*. *Mémoires de l'Institut Royal Colonial Belge, section des Sciences Naturelles et Médicales* 1(3): 1–154.
- van der Zon A.P.M. (1992) *Graminées du Cameroun, volume II, Flore*. Wageningen Agricultural University Papers 92.1: 1–557.
- Veldkamp J.F. (1996) (1221) Proposal to conserve the name *Brachiaria* (Trin.) Griseb. (Gramineae) with a conserved type. *Taxon* 45: 319–320. <http://dx.doi.org/10.2307/1224679>
- Veldkamp J.F. (2004) Miscellaneous notes on mainly southeast Asian Gramineae. *Reinwardtia* 12: 135–140.
- von Linné C. (1771) *Mantissa plantarum altera*. Stockholm, Laurentius Salvius. <http://dx.doi.org/10.5962/bhl.title.119809>
- Watson L., Dallwitz M.J. (1992) *The grass genera of the world*. Wallingford, CAB International.
- Webster R.D. (1987) *The Australian Paniceae* (Poaceae). Berlin & Stuttgart, J. Cramer.
- Webster R.D. (1988) Genera of the North American Paniceae (Poaceae: Panicoideae). *Systematic Botany* 13: 576–609. <http://dx.doi.org/10.2307/2419204>

Manuscript received 1 Feb. 2016; accepted in revised version 16 Jun. 2016.

Communicating Editor: Elmar Robbrecht.