



Pycreus rubidomontanus (Cyperaceae), a widespread but undescribed species from tropical West Africa

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Abstract

Pycreus rubidomontanus is described as a new species. It is relatively widespread in tropical West Africa where it had been confused up to present with *P. atrorubidus*, a very rare endemic species from Zambia in south-central Africa that probably is known only from the type gathering. Differences between these and other similar species are discussed and the new species is copiously illustrated.

Keywords: Cyperaceae, new species, *Pycreus*, taxonomy, tropical West Africa

Introduction

Pycreus atrorubidus Nelmes (1952) was originally described based on a single collection (*Milne-Redhead* 4565, with holotype in K). Although from Mwinilunga in Northern Rhodesia (current-day Zambia) in south-central Africa, it was subsequently also reported from various parts of tropical West Africa. Hooper & Napper (1972) reported it from Guinea, Sierra Leone, Ivory Coast and Liberia (see also Govaerts & Simpson 2007) where it was said to grow on mountains up to 5,000 ft. It is particularly well-represented in the Nimba Mountain area (Adam 1983). As a matter of fact, *P. atrorubidus* soon had a much wider distribution in tropical West Africa than it has in the area from where it was described.

During the preparation of an account for Cyperaceae in tropical West Africa (Mesterházy & al., in prep.), we found that collections of alleged *Pycreus atrorubidus* from that area did not conform with the plant formerly described by Nelmes, not only on morphological but also on ecological and geographical grounds. In fact, this inconsistency was already observed in the past by other cyperologists. J. Raynal, for instance, identified a *Pycreus* from Bambui, Cameroon, preserved in P, as “*Pycreus atrorubidus* Nelmes (au sens de la FWTA)”, implicitly suggesting that this is not exactly the same as was described by Nelmes.

The West African species is here described as a new species, *Pycreus rubidomontanus*. It mainly occurs in mountains of tropical West Africa from Guinea to Cameroon.

Taxonomic part

Pycreus rubidomontanus J.Browning, *sp. nov.* (Fig. 1, 2, 3)

= *P. atrorubidus* sensu. auct. afr. occ., non Nelmes

Perennial, stoloniferous and rhizomatous in dense compact tussocks, rhizomes and stolons thin, ca. 0.5–1 mm across. Culms many per tussock, erect, 8–25 cm long. Leaf blade filiform, 8.5–16 cm long × 0.3–1 mm wide. Inflorescence a single sessile cluster of 3–16 spikelets (rarely a single spikelet). Involucral bract single (or with a second much smaller) erect, leaflike, held as an extension of the culm and making the inflorescence appear pseudolateral, 4–8(–13) cm long.

Spikelets 3–14 (–16) × 2(–2.5) mm, lanceolate, rachilla 0.4–0.5 mm wide, straight but visible as a zig-zag pattern between the glumes when the glumes are still attached. Glumes not closely imbricate, 2–2.4 × 1.5–1.7 mm, deciduous, strongly concave, dark reddish brown to almost black, ovate to elliptic, flanks veinless, with a narrow hyaline margin, rounded with the dark green midrib not reaching the tip, infolding with age. Stamens 2, anthers pale yellow, 0.25–0.3 mm long. Stigma branches 2, in dorsiventral positions. Nutlet red-brown, laterally compressed, obovoid, apiculate, 1.0–1.1 × 0.8–0.9 mm, papillose, with obvious papillae in longitudinal rows.

TYPE: Guinea, Hollandé, Tossékéré, Labé, 15.X.1956, *J.-G. Adam* 12732 (holotype: K K001322386; isotypes: BR BR0000018180220, P P00584799).

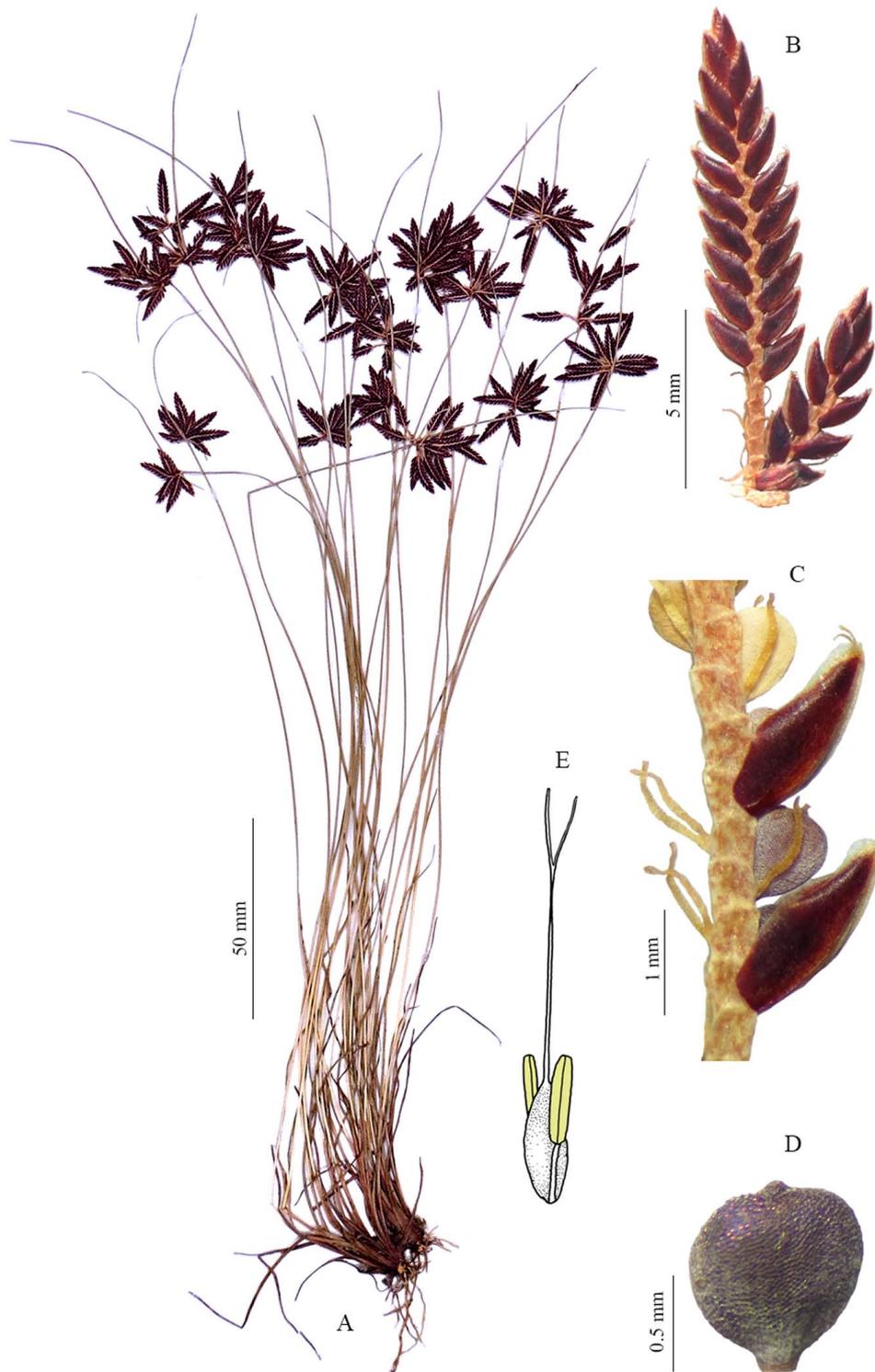


FIGURE 1. *Pycreus rubidomontanus*. A: habit; B: spikelets; C: rachilla, glumes, nutlets and filaments; D: nutlet; E: floret (all from *Adam* 12732, K) (J. Browning)



FIGURE 2. *Pycreus rubidomontanus* in habitat. Sierra Leone, Loma Mountains (Mount Bintumani), 2012. Photo Attila Mesterházy.

RECOGNITION AND AFFINITIES:

Pycreus rubidomontanus has hitherto been confused with *P. atrorubidus* in tropical West Africa. Although superficially similar both are probably only remotely related. *P. rubidomontanus* is a clearly perennial species that ultimately forms mats, producing both rhizomes and stolons (vs. annual). It has an erect involucrel bract up to 13 cm in length (vs. bract patent and much shorter, 1–3.5 cm long). Spikes tend to be more numerous and spikelets longer. Glumes have a clearly hyaline apex and margins (in *P. atrorubidus*, in contrast, the apex of the glume is even darker than the remaining part). Nutlets are finely papillose, with papillae in numerous longitudinal rows (Fig. 3; in *P. atrorubidus* few papillae are seen but this may be due to the nutlets being immature in the type material). In Table 1, the main differences between *Pycreus rubidomontanus*, *P. atrorubidus* and other similar-looking species are listed.

Although having been confused so far with *Pycreus atrorubidus*, the closest relatives of *P. rubidomontanus* may be *P. poikilostachys* Nelmes, *P. melas* (Ridl.) C.B. Clarke, *P. capillifolius* (A. Rich.) C.B. Clarke and related species. These species form a complex of probably closely related species that differ from each other in the smallest of details (see also Reynders 2013). Apart from the rachilla being apparently wider in *P. rubidomontanus* the most notable differences were seen in the glumes and nutlets. Both *P. capillifolius* and *P. melas* have capillary leaves and very narrow spikelets that are rarely more than 1.5 mm wide; in addition, both are annuals. Most similar to *P. rubidomontanus* was found to be *Pycreus poikilostachys*, an endemic of the Zambian region. Both share the usually dark brown glumes with hyaline margins and apex and the long and erect involucrel bract. *P. poikilostachys*, however, is an annual species with much narrower rachilla and slightly longer glumes (ca. 2.4–2.5 mm) and nutlets (ca. 1.5 mm long).

Interestingly, an isotype of *P. rubidomontanus* (Adam 12732) in P is down as *P. reductus* Cherm., an endemic of Madagascar, although no signs of this name are discernable on the sheet. The latter, described by Chermeson (1921), is indeed very similar, not only in general appearance but also in details such as glumes with a narrow hyaline margin and spikelets with an apparently straight rachilla. Its clearly oblong nutlets distinguish *P. reductus* from the other species, especially from *P. capillifolius*.

Pycreus rubidomontanus most likely belongs to section *Globosi* C.B. Clarke, as does *P. capillifolius* (Kükenthal 1935–1936). Although Nelmes (1952) did not discuss the affinities of his *P. poikilostachys*, this species also probably is a member of this section. Kükenthal (1935–1936) considered *P. reductus* to be part of the variable *P. flavidus* (Retz.) T. Koyama, the type of the section. Although we do not agree with this viewpoint, it is obvious that both are similar and probably closely related. All these species have a capitate, apparently pseudolateral inflorescence, narrow spikelets, (narrowly) hyaline-margined glumes that are not closely imbricate (with rachilla showing through) and rounded at apex, two stamens and papillose-tubercled nutlets. However, there are no apomorphies that clearly

characterize this section and the species that were originally accommodated in it do not cluster together in molecular phylogenetic analyses (Reynders 2013). Kükenthal (1935–1936) further included *P. melas* in section *Globosi* and the same could then apply to the very similar *P. micromelas* Lye. However, these two species are more derived and may rather belong to other groups based on nutlet micromorphology (Reynders 2013). They are not likely to be confused with *P. rubidomontanus*.

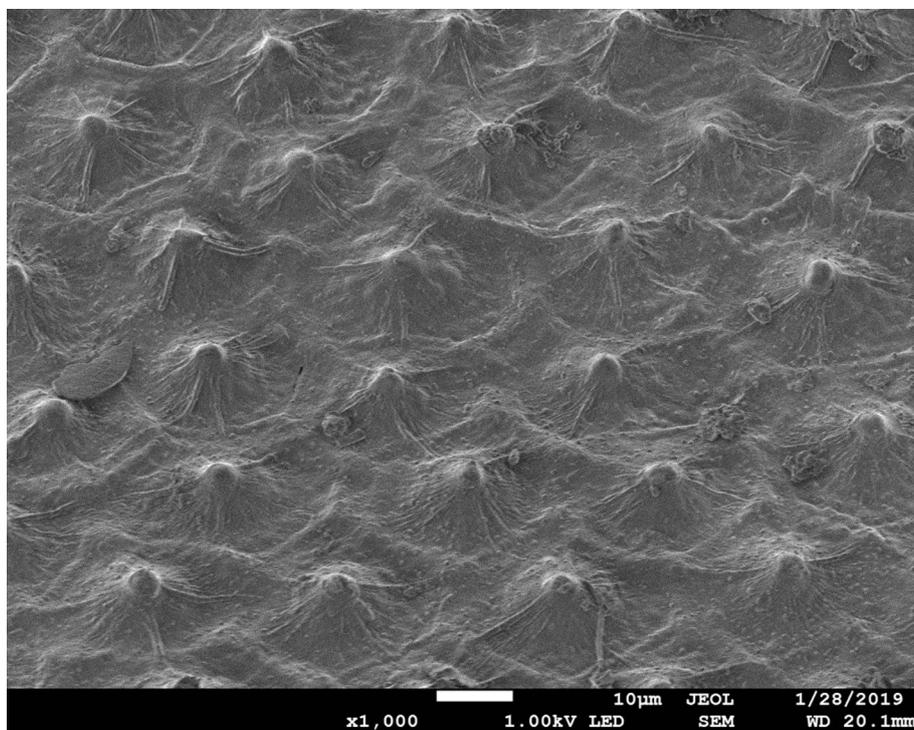
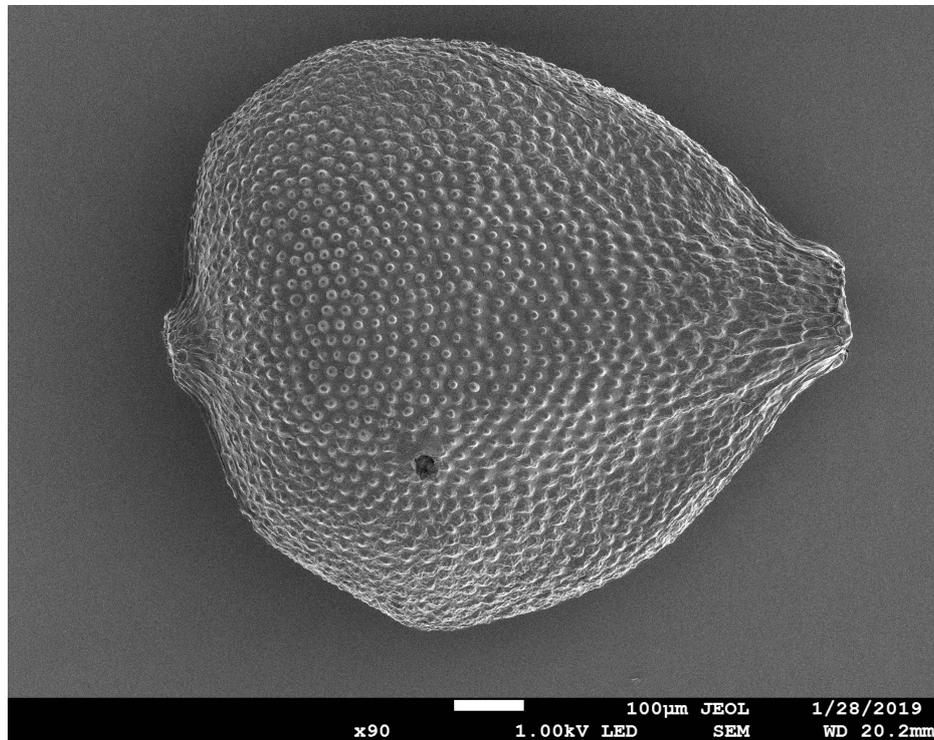


FIGURE 3. *Pycreus rubidomontanus*. SEM of outline of nutlet and surface ornamentation (resp. 100 and 10µm) (from *Adam* 12732, K).

TABLE 1. Comparison of *P. rubidomontanus* and similar-looking species, mostly based on type material (*Adam* 12732, *Milne-Redhead* 4565, Hoenselaar et al. 2010, *Perrier de La Bâthie* 13737 and *Milne-Redhead* 4311 respectively)

	<i>P. rubidomontanus</i>	<i>P. atrorubidus</i>	<i>P. capillifolius</i>	<i>P. reductus</i>	<i>P. poikilostachys</i>
Life form and growth pattern	Perennial, rhizomatous and stoloniferous in tussocks	Single stemmed or tufted annual	Tufted annual	Densely caespitose perennial	Annual
Bract (lower)	Erect, up to 13 cm long	Patent (spreading), 1–3.5 cm long	Erect, up to 13.5 cm long	Erect, up to 5–7 cm long	Erect, almost as continuation of stem
Spikelet number	(3–) 6–10 (–16)	1–7	8–30	4–8	3–8
Spikelet size (mm)	6–16 × 2–2.5	5–10 × 2–2.5	6–19.5 × 1.3–2	8–15 × 1.5–2	7–15 × 2–3
Glume	Apex and margins hyaline	Apex not hyaline, margin if hyaline not obviously so	Margins narrowly hyaline	Apex and margins not or narrowly hyaline	Upper edges broadly hyaline
Nutlet shape	Obovoid, apiculate	Obovate to square-obovate	Obtriangular	Oblong, assymmetric, scarcely apiculate	Oblong-orbicular to oblong-obovate
Nutlet surface	Papillose, papillae obvious	(Immature); indications of possible papillae developing	Minutely tuberculate in longitudinal rows	Regularly finely punctulate	Densely minutely punctulate

DISTRIBUTION:

Widely distributed in tropical West Africa: Sierra Leone, Guinea, Liberia and Ivory Coast (Fig. 4). During our revisions we also found collections of it from Cameroon and Nigeria. *P. rubidomontanus* is exclusively found in mountain regions, ranging in altitude from ca. 1,350 m up to about 2,500 m in Cameroon and Nigeria.

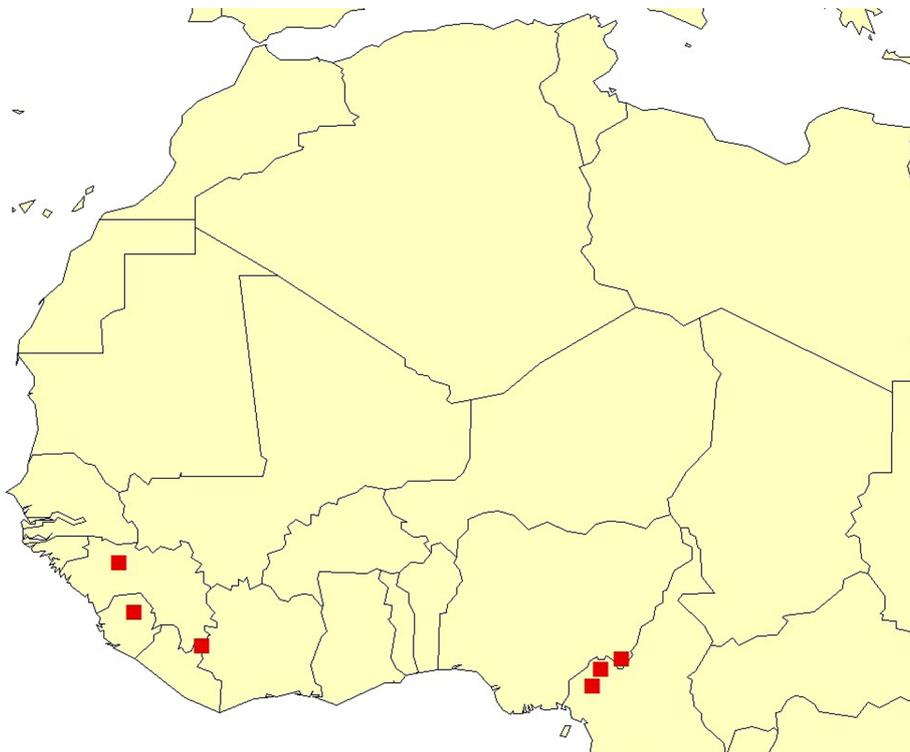


FIGURE 4. Distribution of *Pycreus rubidomontanus* in tropical West Africa (based on herbarium specimens examined).

SELECTION OF SPECIMENS EXAMINED (in addition to the type):

CAMEROON: Dschang, Mt. Bamboutos, 1,950 m., oberhalb der Ferme Pastorale Djuttitsa, an sumpfiger Stelle in Weideland, 29.VI.1955, *A. Saxer* 68 (K); Dschang District, Mt. Bamboutos near Dschang, alt. 8,000–8,200 ft., montane grassland, among rocks, 24.XI.1968, *W.W. Sanford* 5601 (K, MNHN-P-P00584793); Bambui, 1971, *F. Botté* 698 (MNHN-P-P00584739); North-West Region, 21 km on the road from Bamenda to Jakiri, 6°1'0"N, 10°18'0"E (= 6.016667, 10.3), 1,900 m., wind swept slope partly with bare rocks on the surface, covered by lichens, partly covered by grass vegetation. Locally some water still seeping along the rocks, and there, on shallow soil, a rich herbaceous vegetation, 04.XI.1975, *J.J.F.E. de Wilde* 8637 (WAG.1768680, MNHN-P-P00584809); North-West Region, Bui, Elak, Shambai, 6°15'0"N, 10°25'0"E (= 6.25, 10.416667), grassland, 05.XI.1996, *M.P. Munyenyembe, F.M. Mbago & P. Lem* 876 (WAG.0375722);

GUINEA: Monts Nimba, VIII.1954, *R. Schnell* 2641 (K, MNHN-P-P00584800, MNHN-P-P01733846); Mt. Nimba, Nzérékoré, 1,800 m., X.1937, *J. Felix* 1923 (K, MNHN-P-P00584802); Mt. Nimba, Nzérékoré, 1,550 m., s.d., *C. Farron* 247 (WAG.1941701, WAG.1941702); Nzérékoré, Mt. Nimba, 28.X.1971, *J.-G. Adam* 26519 (MNHN-P-P00584736); Nzérékoré, Nimba Mountains, Mare d'Hivernage, 7°39'40"N, 8°22'46"W (= 7.661167, -8.379667), naturally yearly inundated area, 1,612 m., 15.VII.2007, *C.C.H. Jongkind, J.-L. Holié & P. Cherif* 7967 (WAG.1768681, MNHN-P-P01786961); Nzérékoré, Nimba Mountains, plot JRMH01, 7°39'40"N, 8°22'46"W (= 7.661167, -8.379667), 1,613 m., humid depression between higher hills, soil humid, stony, 27.XI.2007, *Nimba Botanic Team* 672 (WAG.1770160); Dalaba, between Koumbouroaguamint and Diaguissa, 1,316 m, temporary wet grassland on laterite, common, 18.X.2016, *I. Larridon* 14 (K, dupl. HNG, GENT);

IVORY COAST: Nimba Mt., 4,500 ft., *C.C. Boughey* GC18164 (K); Danané, Mount Nimba, on moist place among boulders, 15.XII.1967, *C. Geerling & J. Bokdam* 1761 (WAG.1770158);

LIBERIA: Nimba, 1,600 m., rochers, 06.XI.1969, *J.-G. Adam* 24704/2 (MNHN-P-P00584796, MNHN-P-P00584798, MNHN-P-P00584796);

NIGERIA: Saradauna province, Gangirwal, in crevice in soft rock in stream bed, 24.XI.1974, *J.D. Chapman* 3575 (FHI0102084-0);

SIERRA LEONE: [unreadable], marécage sommet, *P. Jaeger* 7886 (K); sommet Pic Bintumani, station humide, XI.1944, *P. Jaeger* 400 (K); Kabala, Mont Loma, 03.XII.1965, *J.-G. Adam* 22350 (MNHN-P-P00584734, MNHN-P-P00584735); Kabala, Mont Loma, 15.XII.1965, *J.-G. Adam* 29274 (MNHN-P-P00584738);

HABITAT:

Pycnus rubidomontanus is always found in damp places, often temporarily humid depressions in montane grassland or between rocks. It is most often seen in wet flush vegetation between bare stones and tall herbaceous vegetation mats. Furthermore, it can be observed on the edge of montane streams. In Nigeria, it has also been collected in crevices of soft rock in a regularly flooded stream bed.

PRELIMINARY IUCN RED LIST ASSESSMENT:

This species is mainly collected from Nimba Mountains, probably because this area is easy-to-access from Liberia, Ivory Coast and Guinea. However, it may be even more abundant on summits of Loma Mountains. It also occurs in the Fouta Djallon highland region in the center of Guinea. In both Cameroon and Nigeria there are high mountain areas that provide good habitats for this species. There are relatively few human activities in these high-altitude regions and most localities are protected. However, most of natural open habitats have been destroyed in the Liberian part of Nimba Mountains due to mining activities; therefore, this species is probably extinct in that country. Since most parts of the Nimba Mountains consist of iron ore, companies may be interested in its exploration, especially in the Guinean part, in spite of legal protection. A potential future threatening factor could also be climate change, although there is no evidence for that. Spatial analysis and IUCN conservation assessments made using GeoCat (Bachman & al. 2011) gave the following results. Extent of Occurrence (EOO) was estimated at 624,500 km² based on about 20 collections, representing the known species range, giving an assessment of Least Concern (LC). Area of Occupancy (AOO) was 20 km², based on the IUCN default 2 × 2 km cell, giving an assessment of Endangered (EN).

PHENOLOGY:

The type collection was made in October. It includes spikes in anthesis, as well as others with mature achenes. Other collections examined were made between June and August and September and December. This is consistent with flowering and fruiting time during or shortly after the rainy season periods in the southern part of tropical West Africa (mostly from the end of April to mid-July and in September and October).

ETYMOLOGY:

The specific epithet refers to the apparently exclusively mountainous areas in which the new species is found (all located well above 1,000 m altitude) and the strikingly dark color of the spikelets, ranging from dark red to almost black.

NOTES:

Recent molecular studies have shown *Pycnus* P.Beauv. to be nested in a paraphyletic *Cyperus* L. s.s. and therefore should be viewed as part of a broadly circumscribed genus *Cyperus* (Larridon & al. 2013, 2014). Although we concur with this point of view, the new species is here described as member of the genus *Pycnus* because the name is needed for an upcoming account on West African Cyperaceae that applies a more conservative taxonomic approach, recognizing genera like *Ascolepis* Nees ex Steud., *Kyllinga* Rottb., *Lipocarpha* R.Br., *Pycnus* and others (Mesterházy & al., in prep.). A combination in *Cyperus* will be made after publication of this paper.

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