



Tephrosia kindiana (Leguminosae: Papilionoideae), a new species from Guinea

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Summary. *Tephrosia kindiana*, a new plant species from Guinea, is described and illustrated. It is a shrub 90 – 120 cm tall, multi-stemmed from the base. The leaves have 5 – 13 oblanceolate leaflets; the inflorescence consists of solitary flowers in the leaf axils, or 2 – 3-flowered fascicles; the flowers are orange and 24 – 26 mm long. The species occurs in wooded grassland on sandstone plateaus at 300 – 420 m elevation. Three localities are known, at up to 13 km apart. *Tephrosia kindiana* is provisionally assessed as Endangered.

Key Words. Africa, Endangered, Fabaceae, Mont Gangan.

Introduction

The genus *Tephrosia* Pers. occurs in tropical, subtropical, and warm temperate regions of the world. It is especially diverse in Africa and Australia (GBIF 2021). IPNI (2021) listed 686 *Tephrosia* species epithets, although the number of accepted species listed by POWO (2021) was 358. The *Flora of West Tropical Africa*, which includes Guinea, recorded 21 species of *Tephrosia* for the whole region (Hepper 1973), and the *Flore de la République de Guinée* (Lisowski 2009) listed 13 species for Guinea. The species of *Tephrosia* are annual or perennial herbs, or softly woody shrubs; rarely small trees (Brummitt *et al.* 2007; Gillett *et al.* 1971). They occur mainly in grasslands, wooded grasslands, and woodlands.

During a seed collecting expedition in Kindia Préfecture, Guinea, a group of about 15 flowering shrubs with large orange papilionaceous flowers were found in wooded grassland. The plants were identified as belonging to the genus *Tephrosia* because of their oblanceolate leaflets with parallel secondary venation and a silvery white indumentum. A collected specimen could not be assigned to any of the accepted species in the genus and is here described as new and illustrated.

Materials and Methods

The expedition during which the type was collected was planned using Google Earth (2019). The area where the new species was discovered was selected because on Google Earth it appeared to contain a selection of habitats that looked relatively undisturbed. Field collections were dried using a portable gas drier. Photographs of the plants were taken with an Olympus

Tough TG5. Research permits were obtained prior to the collecting expedition, and export permits for the herbarium and seed collections were obtained prior to their export (see Acknowledgements).

The herbarium collection from Kindia was compared morphologically with specimens of *Tephrosia* and related genera from West and Central Africa, deposited at Kew (K). The Kindia collection was also compared with the keys and descriptions in the *Flore de la République de Guinée* (Lisowski 2009), the *Flora of West Tropical Africa* (Hepper 1973), the *Flora of Tropical East Africa* (Gillett *et al.* 1971) and *Flora Zambesiaca* (Brummitt *et al.* 2007). IPNI (2021) and POWO (2021) were used to create a spreadsheet list of all taxon names published in *Tephrosia*. The current status of these taxon names according to GBIF (2021) and POWO (2021), accepted or not, was recorded on the spreadsheet list. Images of specimens on JSTOR (2021) and GBIF (2021) were studied, and significant macro-morphological characters were recorded for each accepted species of *Tephrosia* and compared with the herbarium collection from Kindia. All 358 accepted species were studied, because there exists a small chance that a species from another continent might have been introduced to Guinea. If there were at least three significant macro-morphological differences between the taxon on the JSTOR and GBIF images and the specimen from Kindia, we concluded that that taxon name could not be applied to the Kindia collection. The species that most closely macro-morphologically resembles the Kindia collection was used for comparison in the new species diagnosis. If micro-morphological characters and molecular data had been included in the study, a different species might have been chosen for the new species diagnosis.

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All herbarium specimens cited in this study were seen by the authors. The flowers of the type collection were dissected and observed under a binocular microscope. The morphological terminology used follows that of Beentje (2016). The distribution map was prepared using Geocat (2022) and SimpleMapp (2022). A provisional IUCN Red List assessment or extinction risk was carried out following IUCN categories and criteria (IUCN 2012, 2019). Herbarium abbreviations follow Thiers (updated continuously).

Taxonomic Treatment

Tephrosia kindiana Haba, B.J.Holt & Burgt sp. nov.
Type: Guinea, Kindia Préfecture, Mont Kouroula, 6 km E of Koumbaya village, 10°10'55.7"N, 12°50'01.5"W, 420 m, 10 Nov. 2019, Haba, Holt & Burgt 1376 (holotype HNG; isotypes BR, K001187746, MO, P, PRE, SERG, WAG).

<http://www.ipni.org/urn:lsid:ipni.org:names:77318665-1>

Shrub 90 – 120 cm tall, to c. 150 cm wide, multi-stemmed from base. *Branchlets* and leaf rachises with a short, soft, appressed, silvery white indumentum. *Stipules* triangular, to 1.5 × 0.7 mm, caducous. *Leaves* imparipinnate, 3 – 5.5 cm long, petiole 6 – 9 mm long; leaf rachis 10 – 29 mm long, stipels absent; petiolules 1 – 2 mm long; leaflets 5 – 13 per leaf, oblanceolate, base cuneate, margin entire, apex rounded, mucronate, lateral leaflets 1 – 2 × 0.3 – 0.6 cm, terminal leaflet 1.3 – 2 × 0.4 – 0.7 cm, leaflets dull green above, dull lighter green below; upper surface of juvenile leaflets hairy, becoming glabrous, lower surface densely persistent hairy, hairs straight, appressed, silvery, midvein prominent below, secondary veins 9 – 12 pairs, prominent above and below. *Inflorescence* a solitary flower or 2 – 3-flowered fascicles in the leaf axil, peduncle to 1 mm long. Flower bract lanceolate, 1 – 2 mm long, inserted at the base of the pedicel; bracteoles absent, pedicels 6 – 8 mm long. *Flowers* 24 – 26 mm long, calyx with a short, appressed, silvery white indumentum; calyx tube 3 – 4 mm long, 5 calyx lobes, abaxial lobe longest, c. 2 mm long, lateral lobes c. 1 mm long, adaxial lobes placed close together, 0.5 mm long; corolla orange, standard petal erect, perpendicular to wings and keel, 20 – 23 × 17 – 19 mm, claw 3 – 4 mm long, outer surface appressed hairy, inner surface glabrous, margin slightly involute on upper $\frac{1}{3}$ to $\frac{1}{2}$ of blade, apex emarginate; wing petals glabrous, 22 – 25 × 7 – 8 mm, claw 6 – 7 mm long, apex rounded; keel petals glabrous, 20 – 27 × 7 – 8 mm; claw 6 – 7 mm long, apex acute, upper part of keel petals fused. Stamens 10, glabrous, 28 – 30 mm long, diadelphous, with 9 filaments united for $\frac{2}{3}$ of their length, anthers 0.5 – 1 mm

long, dark brown. Ovary 16 × 0.8 mm, densely hairy, 7 – 9-ovulate, style 16 mm long, glabrous, stigma penicillate. *Pod* linear, 5 – 7 × 0.4 – 0.5 cm, 7 – 9-seeded, fruit pedicel 7 – 9 mm long, pod light green, drying dark brown, with a short, soft, appressed, silvery white indumentum. Mature seeds not seen. Figs 1, 2.

RECOGNITION. Macro-morphologically, *Tephrosia kindiana* most closely resembles *T. pentaphylla* (Roxb.) G.Don, a species from Eastern Africa. The species are similar in size and shape of the leaflets, bearing axillary inflorescences with 1 – 3 flowers (most species of *Tephrosia* have many-flowered, axillary or terminal inflorescences,) and a glabrous style. *Tephrosia kindiana* differs in having leaves with 5 – 13 leaflets (vs 3 – 7 leaflets in *T. pentaphylla*), much larger flowers 24 – 26 mm long, with a pedicel of 6 – 8 mm long (vs flowers 7 – 8 mm long, with a pedicel of 3 – 4 mm long), and a penicillate stigma (vs not penicillate).

DISTRIBUTION. *Tephrosia kindiana* is endemic to Guinea, Kindia Préfecture (Map 1).

SPECIMENS EXAMINED. GUINEA. Kindia Préfecture, near village Mayon Kouré, 10°07'36.8"N, 12°52'05.2"W, 390 m, fr., 3 April 2023, Burgt, Konomou, Thiam & Conté 2419 (HNG, K, WAG); Mont Kouroula, 6 km E of Koumbaya village, 10°10'55.7"N, 12°50'01.5"W, 420 m, fl. & fr., 10 Nov. 2019, Haba, Holt & Burgt 1376 (holotype HNG; isotypes BR, K001187746, MO, P, PRE, SERG, WAG); S of Kebe Friguia village, 10°13'11.1"N, 12°56'36.3"W, 310 m, fl., 3 Nov. 2017, Molmou & Dore 1667 (HNG, K).

HABITAT. *Tephrosia kindiana* occurs in wooded grassland on sandstone plateaus at 300 – 420 m elevation.

CONSERVATION STATUS. *Tephrosia kindiana* is known from three collections made up to 13 km apart. The collection Molmou & Dore 1667 is from the Mont Gangan Tropical Important Plant Area (TIPA; Couch *et al.* 2019). The other collections, Burgt, Konomou, Thiam & Conté 2419 and Haba, Holt & Burgt 1376, are from the buffer zone of the same TIPA; a group of about 15 mature plants was observed at each of these two sites. Couch *et al.* (2019) mention several threats to the plant species and the general vegetation in this area. Fires started by cattle herders occur in the wooded grasslands during the dry season. Large herds of cattle have been observed in the region and this can cause damage through trampling and over-grazing. Small-scale cultivation of vegetables and herbs also occurs locally in the wooded grasslands (Couch *et al.* 2019). Although some of the potential threats may have damaged *T. kindiana* plants, the species is apparently somewhat fire resistant because it was found in wooded grassland showing signs of annual dry-season fires, and cattle do not seem to eat the leaves. Populations of *T. kindiana* may have



Fig. 1. *Tephrosia kindiana*. **A** twig with leaves, flowers, and young fruits; **B** leaf lower surface; **C** leaf upper surface; **D** stipule; **E**, **F** open flower (drawn tri-dimensionally, therefore no scale bar); **G** dissected flower: two partly fused keel petals (left), two separate wing petals, a folded standard petal, staminal sheath with 9 partly fused stamens and one free stamen, gynoecium, pedicel and calyx. DRAWN BY XANDER VAN DER BURGT.

been damaged by the construction of the Banéah (or Banieya) dam and reservoir on the Samou River, in 1969, and the Souapiti dam and reservoir on the Konkoure River, in 2021.

The extent of occurrence (EOO) is 45 km², and the area of occupancy (AOO) is 12 km². Both EOO and AOO are likely to be underestimations of the true distribution of the species, as it is expected that further populations are likely to exist but have not yet been found. Nonetheless, the EOO for the species is thought likely to be less than 5000 km² and the AOO under 500 km². The number of known

locations is less than five. The identified ongoing threats have probably resulted in a decline in extent of occurrence, area of occupancy and number of mature individuals. *Tephrosia kindiana* is therefore provisionally assessed here as Endangered B1ab(i,ii,v) + 2ab(i,ii,v).

PHENOLOGY. *Tephrosia kindiana* was collected in flower and young fruit in early November, and in fruit with seeds dispersed in April.

ETYMOLOGY. The species epithet *kindiana* is named after Kindia town and Préfecture, the region to which the species is apparently endemic.



Fig. 2. *Tephrosia kindiana*. **A** flowering plant in wooded grassland habitat on sandstone soil; **B** terminal branchlet with open orange flowers; **C** two open flowers; **D** open flower and part of a young fruit (at bottom right). PHOTOS: XANDER VAN DER BURGT.

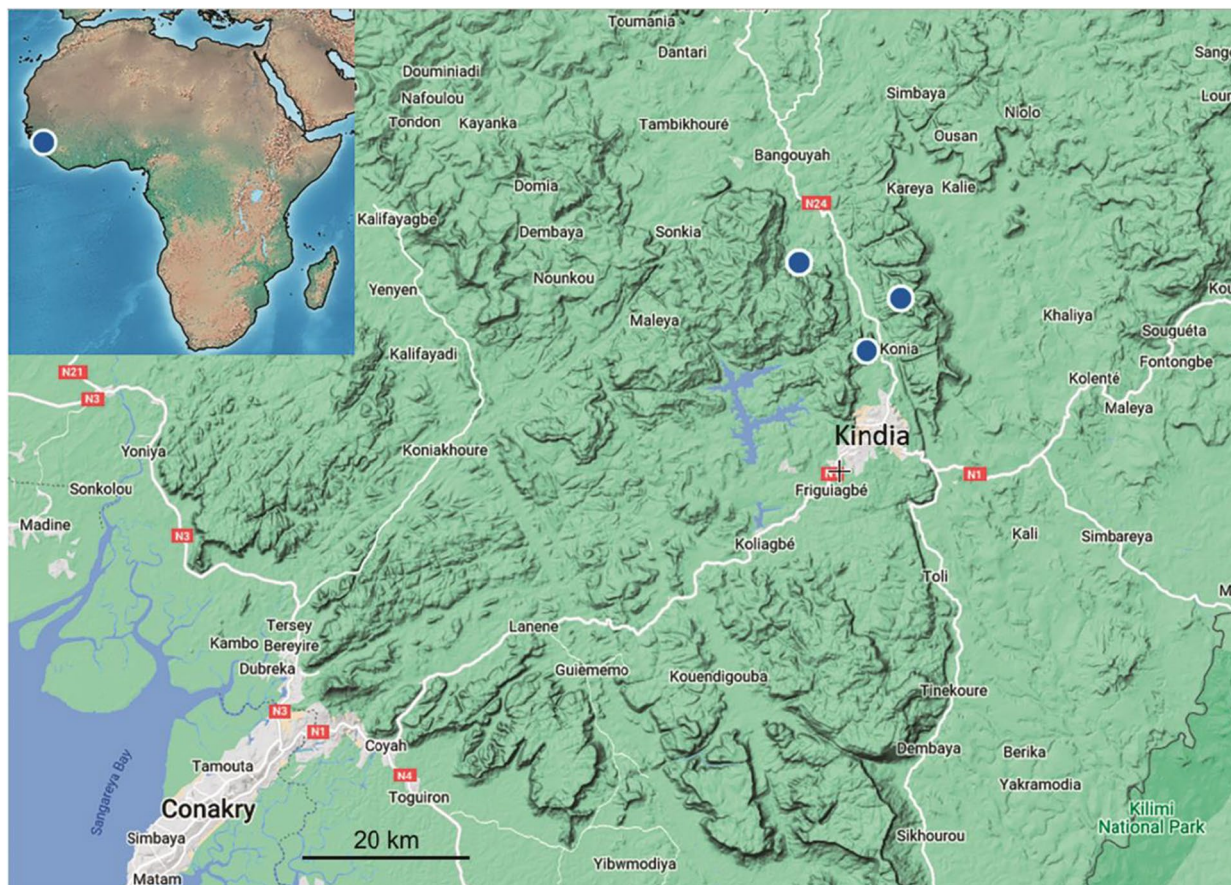
VERNACULAR NAME AND USES. No common names are recorded. The species, with its showy orange flowers, has potential use as an ornamental.

NOTES. Two subgenera of *Tephrosia* were recognised by Brummitt (1980): subgenus *Tephrosia* and subgenus *Barbistyla* Brummitt. The distribution of both subgenera is pan-tropical and subtropical. According to Brummitt (1980), “any discussion of relationships within *Tephrosia* must take into account one character, style pubescence or glabrousness, which seems fundamental to the taxonomy of the genus”. The style of *T. kindiana* is glabrous and this places it in subgenus *Tephrosia*.

Discussion

The Mont Gangan sandstone table mountains form a unique environment within the Kindia Préfecture. The sandstone cliffs, the low-altitude grassland on

shallow rocky soils, and the submontane forest are recognised as threatened vegetation types in Guinea (Couch *et al.* 2019). Four plant species are endemic to this area: *Clerodendrum sylvae* J.-G.Adam (Lamiaceae), *Kindia gangan* Cheek (Rubiaceae; a monotypic genus; Cheek *et al.* 2018), *Phyllanthus felicis* Jean F.Brunel (Phyllanthaceae) and the present new species *Tephrosia kindiana*. In addition, several plant species that are endemic to Guinea are found in the Mont Gangan TIPA, e.g., *Anisotes guineensis* Lindau (Acanthaceae), *Cyanotis ganganensis* Schnell (Commelinaceae), *Fleurydora felicis* A.Chev. (Ochnaceae) and *Pitcairnia feliciana* (A.Chev.) Harms & Mildbr., the only native African member of the Bromeliaceae. This points to an urgent need for a conservation management strategy of the Mont Gangan TIPA (Couch *et al.* 2019).



Map 1. Distribution of *Tephrosia kindiana* (blue dots). Map data © Google 2022.

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Declarations

Conflict of Interest The authors declare that they have no conflict of interest.

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