Abrus kaokoensis (Leguminosae-Papilionoideae-Abreae), a new species from Namibia

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Abstract

Abrus kaokoensis Swanepoel & H.Kolberg, a woody subshrub, is described as a new species. It is only known from the vicinity of the Kunene River and the Baynes Mountains in the Kaokoveld Centre of Endemism, Namibia. Its range is likely to extend into the botanically poorly explored adjacent mountainous parts of southwestern Angola. Illustrations of the species and a distribution map are provided. Probably most closely related to A. schimperi Baker, diagnostic characters of the new species include a suffrutescent habit and terminal elongated racemes with flowers clustered on appressed cushion-like reduced branchlets. A comparative table with diagnostic morphological characters to distinguish between the new species and A. schimperi is provided.

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1. Introduction

Hitherto the climber, Abrus precatorius L. subsp. africanus Verdc., was the only known member of this genus recorded for Namibia. It is widespread in sub-Saharan Africa and in Namibia is known from the central, northern and northeastern parts (Craven, 1999; Germishuizen and Meyer, 2003). In this contribution, a rare new species of Abrus is described from the Kaokoveld in northwestern Namibia. During a number of botanical expeditions to the region between 2005 and 2010, the authors independently encountered an unusual species of Abrus that grows as a subshrub near Swartbooisdrif (H. Kolberg) and in the Baynes Mountains (W. Swanepoel). These plants are here proposed as a distinct new species. The Abrus holdings in WIND revealed only one earlier collection of the new species (Bethune s.n.), filed under A. precatorius subsp. africanus. A specimen from the Kaokoveld in PRE, Merxmüller & Giess 30490, labelled Abrus cf. laevigatus, also belongs to the new species.

2. Materials and methods

Live plants of the new species were studied in the field. Morphological characters in the following description were determined from live material, fresh flowers and mature fruits. For Abrus schimperi Baker (Verdcourt, 1971) diagnostic features were sourced from literature (Harder, 2007; Verdcourt, 1970, 1971).

3. Taxonomy

3.1. Description

Abrus kaokoensis Swanepoel & H.Kolberg, sp. nov., similis A. schimperi Baker ligno fruticulo, sed planta parvula (0.3 usque ad 1.0 m altam), plerumque minoribus paribus oppositis
foliolis (4–8); apice folioli acuto, raro rotundo, basi obtuso, subcordato, saepe obliquó; inflorescentis plerunque brevioribus (20–120 mm), calyce infundibulari lobatoque, corolla numquam lutea vel cremea; leguminibus gracilibus non-tuberculatis, seminibus elipsoidalibus sive obovoidis, dimensionis longissimis ± 30° ad axem longam leguminis dispositis differt.

TYPE — Namibia, Kunene Region, stony southern slopes of Kunene River Valley, 1 km NNE of Sodalite Mine on track to Kunene River, 850 m a.s.l., 11-03-2010. Swanepoel & Kolberg 288 (WIND, holo.; PRE, iso.).

Woody suffrutex, multi-stemmed, 0.3–1.0 m tall. Stems numerous arising from a woody rootstock, ascending and virgate, lenticels often prominent. Bark smooth, sometimes longitudinally fissured; on young stems reddish brown, appressed pubescent with indumentum white; on older stems grey or brown, glabrous. Leaves alternate and distichous, rarely opposite or 2- or 3-clustered, (4.5–7.8)-jugulate; rachis 12–39 mm long including 2–9 mm long petiole, shallowly grooved adaxially, projecting 1.0–3.5 mm beyond terminal pinna pair, appressed pubescent; pinnae (3–)7–14(–16) × (2–)4–7(–8) mm, dimensions usually distally increasing, oblong, obovate-oblong, elliptic or narrowly obovate, acute, rarely rounded, mucronulate, base obtuse or subcordate, often oblique, venation prominent, particularly midrib abaxially, slightly discolorous, green adaxially, darker green abaxially (in herbarium material paler abaxially), appressed pubescent abaxially with hairs ± oriented towards apex, glabrous adaxially; petiolules 0.7–0.9 mm long, appressed pubescent; stipules 3.4–4.7 mm long, narrowly lanceolate, densely appressed pubescent; stipels 0.2–0.7 mm long, appressed pubescent; indumentum white, 0.2–0.4 mm long. Inflorescence terminal or rarely lateral, elongated, racemose, usually also sessile in upper axes, appressed pubescent; rachis 20–120 mm long excluding very short peduncle; flowers clustered on appressed cushion-like reduced pubescent; rachis 20–120 mm long including 2–9 mm long petiole, shallowly grooved adaxially, projecting 1.0–3.5 mm beyond terminal pinna pair, appressed pubescent; pinnae (3–)7–14(–16) × (2–)4–7(–8) mm, dimensions usually distally increasing, oblong, obovate-oblong, elliptic or narrowly obovate, acute, rarely rounded, mucronulate, base obtuse or subcordate, often oblique, venation prominent, particularly midrib abaxially, slightly discolorous, green adaxially, darker green abaxially (in herbarium material paler abaxially), appressed pubescent abaxially with hairs ± oriented towards apex, glabrous adaxially; petiolules 0.7–0.9 mm long, appressed pubescent; stipules 3.4–4.7 mm long, narrowly lanceolate, densely appressed pubescent; stipels 0.2–0.7 mm long, appressed pubescent; indumentum white, 0.2–0.4 mm long. Inflorescence terminal or rarely lateral, elongated, racemose, usually also sessile in upper axes, appressed pubescent; rachis 20–120 mm long excluding very short peduncle; flowers clustered on appressed cushion-like reduced branchlets often arranged unilaterally on rachis; reduced branchlets subtended by an often caducous, appressed pubescent stipule up to 2.2 mm long with 3–5 unequal subulate lobes, centre lobe longest; pedicels 1.6–1.8 mm long; bracts and bracteoles 0.4–0.6×1.2–1.8 mm, narrowly lanceolate, somewhat cucullate, appressed pubescent abaxially; indumentum white. Calyx 3.9–4.8 mm long, infundibular with 5 deltoid-acuminate lobes, upper pair united except for apical part, appressed pubescent on outside surface. Corolla blue, violet, mauve or pink-purple, glabrous, 10–17 mm long; standard ovate, 9–15×6–11 mm, often with 2 small deltoid teeth towards base, retuse, claw broad, ±2.4×1.7 mm; wings narrowly falcate to culitate, 6–13×2–3 mm, claw 2.5–3.4 mm long; keel petals falcate, 8–16×3–4 mm, each with a pocket interlocking with wings, claw 3–4 mm long. Stamens 9, joined into a sheath split at apex, ±9 mm long, ±1 mm diam., white, glabrous; 5 longer stamens with free part of filaments 2.8–4.1 mm long, anthers ±1 mm long; 4 shorter stamens with free part of filaments 2.1–3.3 mm long, anthers ±0.8 mm long. Ovary sessile, ±8 mm long, appressed pubescent abaxially, indumentum white; style terete, white, glabrous, ±7.5 mm long, upcurved, projecting well beyond anthers; stigma capitate with irregular fimbriellae.

 Pods oblong, rarely narrowly obovate, smooth, appressed pubescent, indumentum white, some hairs with rufous base, subturgid, ± separte, valves thin, woody, springing into spirals upon dehiscence, 2–6-seeded, acute with beak usually hooked, base cuneate-obtuse, khaki to yellow brown when dry, 28–47×9–15 mm. Seeds ellipsoid or obovoid, compressed, dull, dark brown or black, irregularly mottled olive-green or rarely yellow-green, minutely shagreened, arranged in pod with longest dimension ±30° to long axis of pod; hilum small, eccentric, exarillate, but with funicle remnant (Fig. 1).

3.2. Phenology

Abrus kaokoensis was found flowering in March, following good rains.

3.3. Diagnostic characters

Abrus kaokoensis is probably most closely related to A. schimperi as both species are shrubs (not lianes) with terminal elongated inflorescences with woody pods and compressed seeds. It differs from A. schimperi in habit, as well as in characters of the leaves, inflorescences, flowers, pods and seed. A. kaokoensis is a subshrub, reaching a maximum height of 1 m, whereas A. schimperi is usually a much taller shrub, with a maximum height of about 3.6 m.

The leaves in A. kaokoensis are 4–8-jugulate with the leaflets oblong, ovate-oblong, elliptic or narrowly obovate. In A. schimperi the leaves are 7–34-jugulate and the leaflet shape is oblong or oblong-elliptic. The leaflet apex in A. kaokoensis is acute, rarely rounded and the base obtuse or subcordate and often oblique, whereas in A. schimperi the apex is always rounded and the base rounded to subacute. The leaflets differ furthermore in that they are usually much smaller in A. kaokoensis, only up to 16×8 mm, whereas in A. schimperi they reach double the size, up to 33×15 mm.

Differences in the floral characters include the inflorescences, which in A. schimperi can be much longer than in A. kaokoensis. The infundibular, lobed calyx in A. kaokoensis is considerably larger than the obconic, truncate or undulate calyx in A. schimperi. The corolla in A. kaokoensis is uniform in colour whereas the wings in A. schimperi usually are darker than the standard. Apart from the different shades of blue, mauve, violet or purple which the corollas of both taxa share, the corolla in A. schimperi may also be cream or yellow coloured.

In A. kaokoensis the pods are markedly smaller and thinner than in A. schimperi and lack the small tubercles that cover the surface of the latter. The seeds of the two taxa also differ; the usually larger, olive or yellow–green mottled seeds of A. kaokoensis are ellipsoid or obovoid in shape and the long axis is arranged at ±30 degrees to the long axis of the pod. Seeds of A. schimperi are rounded-oblong or rhombic, brown with dark brown mottling and arranged with the long axis at right angles to the long axis of the pod.

Some of the more prominent morphological features to differentiate A. kaokoensis from A. schimperi are compared in Table 1.
3.4. Distribution and habitat

*Abrus kaokoensis* is known only from three localities (Fig. 2); one population each in the Baynes Mountains, the Epupa area and a few sub-populations to the west of Swartbooisdrif in the northern part of the Kaokoveld Centre of Endemism (*Van Wyk and Smith, 2001*), Kunene Region, Namibia. In the Baynes Mountains it occurs 125 km from the
Table 1
Diagnostic differences between *Abrus kaokoensis* and *A. schimperi*.

| Character         | *A. kaokoensis*                  | *A. schimperi*                  |
|-------------------|----------------------------------|---------------------------------|
| Habit             | Subshrub, 0.3–1.0 m tall         | Shrub, 0.9–3.6 m tall           |
| Leaves            |                                  |                                 |
| Leaflet pairs     | 4–8                              | 7–9 (subsp. *africanus*)        |
|                   |                                  | 10–17 (subsp. *oblongus*)       |
|                   |                                  | 14–34 (subsp. *schimperi*)      |
| Leaflet shape     | Oblong, ovate-oblong, elliptic or narrowly obovate | Oblong–elliptic or oblong |
| Leaflet size      | 3.0–16.0×2.0–8.0 mm              | 5.0–33.0×4.5–15.0 mm            |
| Leaflet apex      | Acute, rarely rounded            | Rounded                        |
| Leaflet base      | Obtuse, subcordate, often oblique| Rounded to subacute             |
| Inflorescences (length) | 20–120 mm                       | 20–80 mm (subsp. *oblongus*)   |
|                   |                                  | 130–260 mm (subsp. *africanus*)|
|                   |                                  | 130–300 mm (subsp. *schimperi*)|
| Flowers           |                                  |                                 |
| Calyx (shape)     | Infundibular                     | Obconic                         |
| Calyx (size)      | 3.9–4.8 mm long                  | 3.0 mm long                     |
| Calyx (margin)    | Lobed; lobes deltoid-acuminate   | Truncate or undulate            |
| Corolla (colour)  | Uniform; blue, violet, mauve or pink–purple | Wings usually darker than standard; cream, yellow or blue and mauve to purple or light violet |
| Pods              |                                  |                                 |
| Size              | 28–47×9–15 mm                    | 52–79×7–13 mm                   |
| Valves            | Thin; surface smooth (non-tuberculate) | Thick; surface usually markedly tuberculate, sometimes velutinous |
| Seed              |                                  |                                 |
| Shape             | Ellipsoid or obovoid             | Rounded-oblong or rhombic       |
| Size              | 5.7–12.5×4.3–5.3×3.4–3.6 mm      | 5.0–7.5×5.0–6.0×2.0–3.0 mm      |
| Colour            | Dark brown or black, mottled olive green or yellow–green | Brown with darker brown motting |
| Arrangement in pod| With longest dimension ±30 degrees to long axis of pod | With longest dimension at right angles to long axis of pod |
| Indumentum (colour) | White                           | Golden or grey                 |
| Distribution      | Kaokoveld, northwestern Namibia  | Southern Africa (Zambia, Malawi, Mozambique, Zimbabwe), Eastern, Central and North-Eastern Africa |

Fig. 2. Known distribution of *Abrus kaokoensis*. 
coast near Otjipemba, on the slopes of a river valley. The Epupa population is 37 km to the ENE of the Baynes population, ±8 km SSW of Epupa Falls. The population near Swartbooisdrif is 55–64 km further to the southeast, in the vicinity of Sodalite Mine and the Zebra Mountains near the Kunene River. Average annual rainfall varies from ±200 mm in the Baynes Mountains to ±300 mm at Swartbooisdrif (Mendelsohn et al., 2002). A. kaokoensis is locally uncommon to rare and grows on stony soil and amongst rocks in small isolated communities of about 40 plants each in full sun and in partially shaded areas. It occurs at altitudes of 725–890 m. Associated woody species include Catophractes alexandri D.Don, Colophospermum mopane (Kirk ex Benth) J.Léonard, Combretum imberbe Wawra, Commiphora multijuga (Hiern) K.Schum., Corchorus angolensis Exell & Mendonça, Croton menyhartii Pax, Rhigozum virgatum Merxm. & A.Schreib. and Terminalia prunioides M.A. Lawson.

It seems likely that A. kaokoensis may also be found to occur in the adjacent botanically poorly explored mountainous parts of southwestern Angola. It may also prove to be more widespread in Namibia, in the rather inaccessible mountainous area bordering the Kunene River.

3.5. Conservation status

Although uncommon to rare and known from three localities only, Abrus kaokoensis is not threatened at present. Despite the plants in the Epupa and Swartbooisdrif areas being browsed by livestock, they otherwise seem healthy as with the Baynes Mountains population which is in an unpopulated area. Of concern, however, is the fact that very few flowers and pods were observed in the field. In addition very few young plants were seen and no seedlings at all. An investigation during March 2010, revealed that the flowers are wholly consumed by a species of blister beetle (Coleoptera-Meloidae) as soon as they are fully developed; to such an extent that only very few flowers survive to produce fruit and seed. In a population of about 40 plants in an area of 50 × 15 m, only the remains of 10 pods were found. Whether these pods produced any viable seed could not be established.

3.6. Etymology

The specific epithet refers to the Kaokoveld in northwestern Namibia, a region forming part of the Kaokoveld Centre of Endemism (Van Wyk and Smith, 2001). This biogeographically well-defined region extends into southwestern Angola.

3.7. Additional specimens examined

Namibia, Kunene Region:

– 1712 (Posto Velho): Baynes Mountains, 15 km NNW of Otjipemba, lower slopes of river valley (–BB), Swanepoel 287 (WIND).
– 1713 (Posto Velho): Kunene, Namibia, riverine woodland (–AA), Bethune s.n. (WIND); 12 km west of Swartbooisdrif on track to Epupa (–BC), Kolberg & Tholkes HK2204, HK2610 (WIND); 16 km west of Swartbooisdrif on track to Epupa (–BC), Kolberg, Craven & Tholkes HK1511 (WIND); 1 km NNE from Sodalite Mine on track to Kunene River (–BD), Kolberg & Tholkes HK2484 (WIND); 1 km NNE of Sodalite Mine on track to Kunene River (–BD), Swanepoel & Kolberg 288 (WIND, PRE).

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