

A new shrubby species of *Nasa* Weigend ser. *Carunculatae* (Urb. & Gilg) Weigend (Loasaceae) from the Amotape-Huancabamba Zone

Nueva especie arbustiva de *Nasa* Weigend ser. *Carunculatae* (Urb. & Gilg) Weigend (Loasaceae) de la Zona Amotape-Huancabamba

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Abstract

Nasa is the largest genera in the Loasaceae family and it is particularly speciose in the Amotape-Huancabamba Zone of northern Peru. *Nasa* ser. *Carunculatae* is a group of four species, three of them endemic to the Amotape-Huancabamba Zone. Species in this group are characterized by their shrubby habit, deciduous leaves, and typical tilt-revolving flowers with white to greenish petals. In this work, we describe a new species of *Nasa* ser. *Carunculatae* from the southern limit of Amotape-Huancabamba area, La Libertad, Peru. The species differs from others in having much smaller and notably narrower leaves. Unlike all the other species of ser. *Carunculatae*, the entire distal portion of the stem is densely glandular. It is apparently most closely related to *Nasa carunculata*, a species known from inter-Andean valleys of Ancash and Ayacucho.

Keywords: *Nasa sanagoranensis*, Loasaceae, new species, La Libertad, Peru

Resumen

Nasa es uno de los géneros más numerosos de la familia Loasaceae y en particular uno de los más especiosos en la zona de Amotape-Huancabamba. *Nasa* ser. *Carunculatae* es un grupo con cuatro especies, tres de las cuales son endémicas de la zona de Amotape-Huancabamba. Las especies de este grupo están caracterizadas por su hábito arbustivo, hojas deciduas y flores con pétalos blancos a verdosos del tipo con escamas florales que encierran al néctar y que obligan al polinizador a inclinarlas ("tilt-revolver flowers"). En el presente trabajo, nosotros describimos una nueva especie del grupo *Nasa* ser. *Carunculatae*, procedente del límite sur de la zona de Amotape-Huancabamba, La Libertad, Perú. La especie difiere por presentar hojas mucho más pequeñas y notablemente más angostas. A diferencia de las otras especies de la ser. *Carunculatae*, la porción distal del tallo es densamente glandular. Aparentemente está estrechamente relacionada a *Nasa carunculata*, una especie conocida de los valles interandinos de Ancash y Ayacucho.

Palabras clave: *Nasa sanagoranensis*, Loasaceae, nueva especie, La Libertad, Perú

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Introduction

Nasa is the largest genus of the family Loasaceae and comprises ca. 100 species (Weigend et al. 2006). It has its centre of diversity in Peru and especially in northern Peru and southern Ecuador, the so-called Amotape-Huancabamba Zone, where a particularly large number of narrow endemics occur, often known only from single localities (Dostert & Weigend 1999; Rodríguez & Weigend 2007; Weigend 2000, 2002; Weigend & Rodríguez R. 2002, 2003; Weigend et al. 1998, 2003). The infrageneric systematics of *Nasa* remain largely obscure and the morphological groups may not represent natural entities (Weigend & Gottschling 2006).

However, while the majority of taxa represent herbaceous plants, there are three morphologically comparatively well-defined species groups which include shrubby representatives. Two of them, *Nasa* ser. *Grandiflorae* (Urb. & Gilg) Weigend and *Nasa* ser. *Alatae* (Urb. & Gilg) Weigend have orange or yellow, campanulate corollas. The third shrubby group, *Nasa* ser. *Carunculatae* (Urb. & Gilg) Weigend has the typical tilt-revolver-flowers with white or bicolorous petals, which are common across the subfamily Loasoideae.

The representatives of ser. *Carunculatae* are much-branched from the base and have ovate, lobed leaves. Unlike all other species of *Nasa*, they are deciduous and loose most or all of their leaves at the end of the wet season (usually May/June). *Nasa* ser. *Carunculatae* was last revised in 2003 (Weigend et al. 2003), and four species were recognized, with a northernmost representative in the extreme South of Ecuador (*N. connectans* Weigend), two species in the Amotape-Huancabamba Zone [*N. macrothyrsa* (Urb. & Gilg) Weigend and *Nasa usquiliensis*

Weigend, T.Henning & C.Schneid.] and another, widespread species in inner-andean valleys from northern Ancash to Ayacucho [*N. carunculata* (Urb. & Gilg) Weigend].

Material examined

One of us (AC) collected yet another species clearly belonging to this group in the Amotape-Huancabamba Zone in the Department La Libertad in June 2008 (Figure 1). The species was collected in the Sanagoran District (Prov. Sanchez Carrión, Depto. La Libertad) and is clearly closely allied to *N. carunculata* (Figure 5), but also clearly falls outside the range of that species and is here described as a species new to science. *Nasa sanagoranensis* sp. nov. can be easily distinguished from the previously known species of the group by its smaller leaves which are only shallowly lobulate, faintly serrate and shortly petiolate and its distinctly smaller flowers. To describe the new species a taxonomic treatment is given as well as an updated key for *Nasa* ser. *Carunculatae*.

Characteristics

The five species of the *Nasa carunculata* complex can be readily distinguished by morphological characters. The most easily observed characters are lamina shape and size, indumentum, flower (nectar scales, petals) and fruit morphology.

Growth habit. *Nasa sanagoranensis* is a deciduous, perennial shrub like the other members of *Nasa* ser. *Carunculatae*. It is the smallest species of this group, with its numerous erect to ascending stems reaching a height of only 50–60 cm (versus 100–200 cm in the other taxa).

Leaf morphology. Lamina shape and size are often taxonomically informative in *Nasa* ser. *Carunculatae*. Leaf margins are deeply lobulate with 4–7 coarsely serrate lobules on each side (*N. macrothyrsa*, *N. usquilliensis* and *N. carunculata*) or only shallowly lobulate (*N. connectans*). The lamina of *N. sanagoranensis* is ovate with a truncate to subcordate base and an acuminate apex. *Nasa sanagoranensis* has the narrowest leaves in the whole complex (and some of the narrowest in the genus), which are intermediate in lobule depth between the two types described above. With a leaf size of ca. 40–110 x 10–15 mm the leaves are also the smallest known from *Nasa* Ser. *Carunculatae* (the other species have leaves 80–170 (up to 400 in *N. macrothyrsa*) x 25–110 mm). The petioles are very short (4–5 mm versus 10–80 mm in the other species) and the bracts and upper leaves are sessile.

Inflorescence morphology. *Nasa sanagoranensis* has terminal mono- or dichasia or few-branched thyrsoids with 5–8 pendent flowers as typical for *N. ser. Carunculatae*. More complex inflorescence branching as reported from *N. macrothyrsa* is absent.

Indumentum. In *Nasa* three basic types of trichomes are found (Doster & Weigend 1999): uniseriate gland-tipped trichomes, scabrid/glochidiate trichomes and stinging hairs (setae). *Nasa sanagoranensis* has dense indumenta of glochidiate trichomes on almost all parts of the plant. Scabrid trichomes are restricted to stem and adaxial leaf surface. Setae are generally scarce compared to other members of the complex. Reddish brown setae are found on stem, adaxial leaf surface and especially calyx and fruit. White setae are restricted to the abaxial leaf surfaces and distal parts of the stem. Uniseriate

gland-tipped trichomes, usually rare and restricted to the petals in *Nasa ser. Carunculatae*, very densely cover all distal parts of *Nasa sanagoranensis*. The dense cover with glochidiate hairs and the abundance of uniseriate, gland-tipped trichomes in the inflorescence are unique in *Nasa ser. Carunculatae*.

Flower morphology. *Nasa ser. Carunculatae* has the typical tilt-revolver flowers morphology of *Nasa*, as described elsewhere (Weigend & Gottschling 2006: p. 125, Fig. 1) Overall morphology, shape and colouration of the flowers of *Nasa sanagoranensis* differ only marginally from the other species of the group. However, the flowers are strikingly small (ca. 20 mm in diam.) and are the smallest in the group and some of the smallest in the genus.

Distribution. *Nasa sanagoranensis* was collected close to the southernmost limit of the so called Amotape-Huancabamba Zone (Berry 1982, Ayers 1999, Young & Reynel 1997, Weigend 2002, 2004). This phytogeographical zone reaches from the Rio Jubones system in Ecuador to the Rio Chamaya system in Peru (Weigend 2004) and is a species rich area with an exceptional percentage of endemism (Young & Reynel 1997, Weigend et al. 2005a, b). *Nasa sanagoranensis* is the fourth species of *Nasa ser. Carunculatae* from the Amotape-Huancabamba Zone, only one species, *N. carunculata*, occurs outside this region. *Nasa Ser. Carunculatae* thus conforms to a pattern observed in numerous species groups such as *Nasa ser. Grandiflorae*, *N. ser. Alatae* and the *N. stuebeliana* group, but also in entirely unrelated plant groups such as *Ribes*, *Passiflora*, *Urtica* (Skrabal et al. 2001, Weigend 2002, 2004, Weigend et al. 2005b, Weigend et al. 2006). Figure 1.

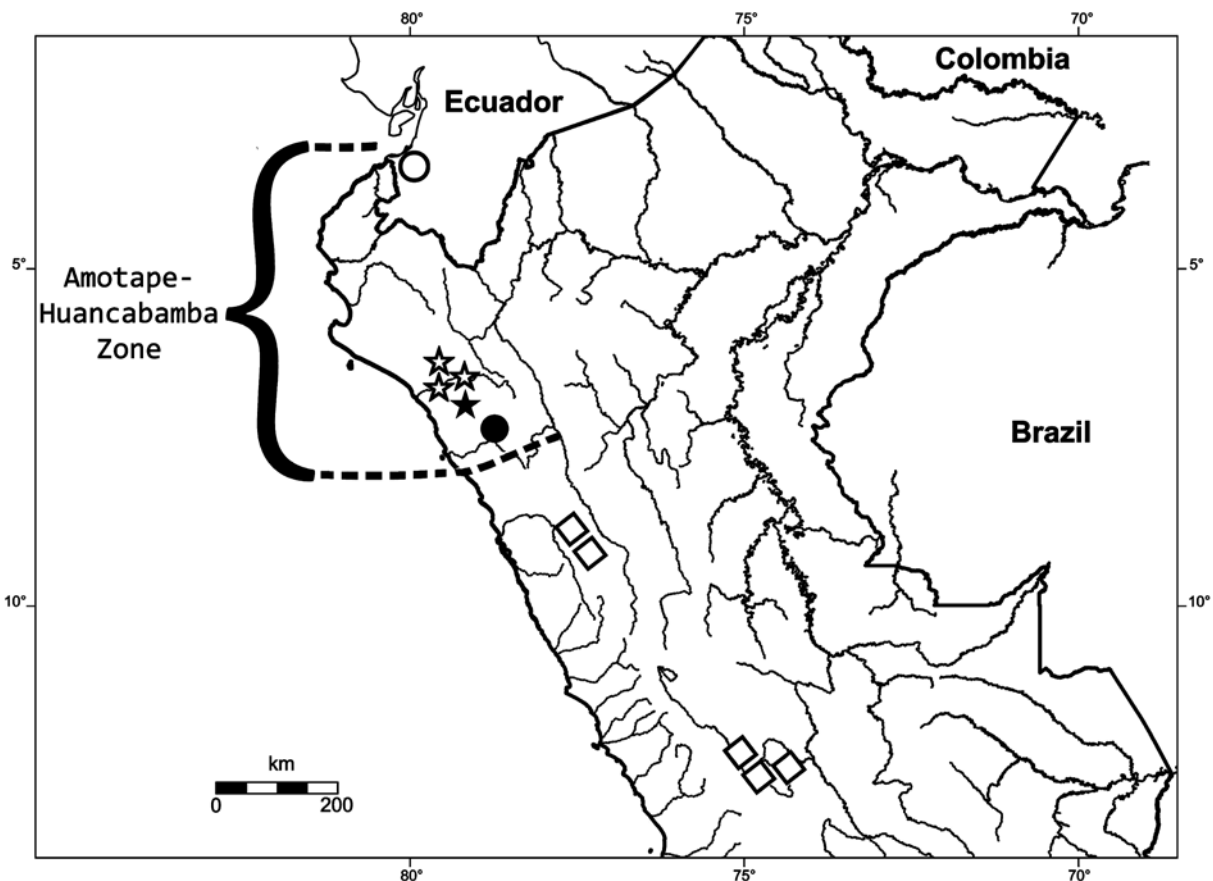


Figure 1. Distribution map of the species of *Nasa ser. Carunculatae*. *N. connectans* (white circle), *N. macrothyrsa* (white stars), *N. usquilliensis* (black star), *N. sanagoranensis* sp. nov. (black circle) and *N. carunculata* (white rhomboids).

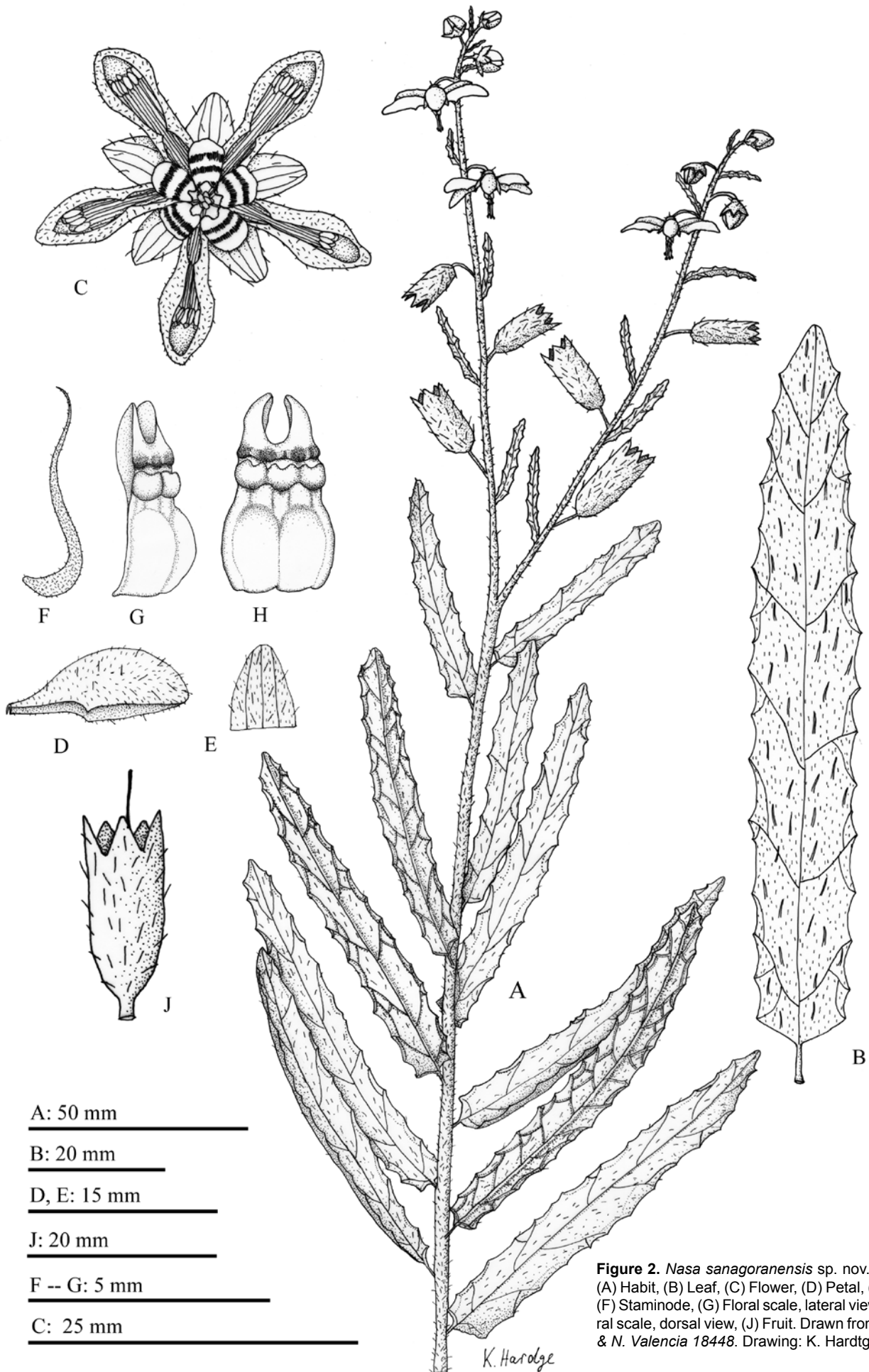


Figure 2. *Nasa sanagoranensis* sp. nov. Drawing. (A) Habit, (B) Leaf, (C) Flower, (D) Petal, (E) Sepal, (F) Staminode, (G) Floral scale, lateral view, (H) Floral scale, dorsal view, (J) Fruit. Drawn from A. Cano & N. Valencia 18448. Drawing: K. Harolze.



Figure 3. Habitat and habit of *Nasa sanagoranensis* sp. nov. (A. Cano & N. Valencia 18448) Photo by Asunción Cano.



Figure 4. Flower of *Nasa sanagoranensis* sp. nov. (A. Cano & N. Valencia 18448). Photo by Asunción Cano.



Figura 5. Flower of *Nasa carunculata* (Urb. & Gilg) Weigend (M. Weigend et al. 5035). Photo by Maximilian Weigend.

Key to the species of *Nasa* ser. *Carunculatae*

1. Petioles less than 7 mm long, lamina 4–9 (–12) cm long (on vegetative shoots and below inflorescence). 2
2. Leaves always at least slightly rugose, narrowly triangular to ovate (> 25 mm wide); petals 14–19 mm long. *N. carunculata*
2. Leaves flat, shallowly lobulate and narrow (< 20 mm wide); petals 8–11 mm long. *N. sanagoranensis* sp. nov.
1. Petioles 15–40 (–80) mm long, lamina 10–20 cm long (on vegetative shoots and below inflorescence). 3
3. Floral scales 5–6 mm long, red and dark yellow; petals 12–17 mm long; fruiting pedicels ca. 10 mm; only S Ecuador. *N. connectans*
3. Floral scales 8–11 mm long, red and white or greenish white; petals 20–30 mm long; fruiting pedicels 20–30 mm, only N Peru. 4
4. Petals ca. 9 mm deep, claw ca. 7 mm long; floral scales dorsally with two red transversal stripes (scale neck, callus); leaves abaxially whitish from scabrid trichomes ca 0,5–0,75 mm long. *N. macrothyrsa*
4. Petals 5–7 mm deep, claw ca. 4 mm long; floral scales dorsally with three red transversal stripes (scale neck, callus, nectar sacs distally); leaves abaxially green with glochidiate trichomes ca 0,25–0,5 mm long. *N. usquiliensis*

Formal Taxonomy

Nasa sanagoranensis T. Henning, M. Weigend & A. Cano, sp. nov.

(Figs. 2 A–J, 3, 4)

TYPE: Peru. Dept. La Libertad. Prov. Sanchez Carrión. Ditrío Sanagoran. Rocky slope, 2727–2739 m, 0813625-9137456, 05.06.2008, A. Cano & N. Valencia 18448 (holotype: USM, Isotypes BSB, HUT).

Haec species N. carunculatae affinis, sed ab ea foliis multo angustioris, indumento glanduloso, atque corolla minora differt.

Coarse perennial shrub 50–60 cm tall, with numerous stems from base, these basally decumbent, up to > 6 mm thick near base, sparsely covered with reddish brown setae 1,5–2 mm long and densely covered with glochidiate trichomes. Petioles 4–5 mm long, sparsely setose, upper leaves sessile; lamina elongate, 40–110 mm long, 10–15 mm wide, base cuneate to rounded, margin entire to shallowly lobulate with 4–7 lobules on each side, each 2–5 mm long and 5–10 mm wide, coarsely serrate; abaxial surface covered with few pale setae 1–1,5 mm long and very densely covered with glochidiate trichomes 0,25–0,5 mm long, adaxial surface covered with reddish brown setae 2–2,5 mm long, scabrid trichomes 0,5–0,75 mm long and shorter glochidiate trichomes.

Flowers in a terminal mono- or dichasia or few-branched thyrsoids up to 35 cm long overall, with 1–3 monochasial branches and 5–8 pendent flowers per branch; bracts lanceolate, shallowly serrate, approximately 5–10 mm long, 2–3 mm wide; pedicels ca. 5–8 mm long; calyx very densely covered with glochidiate trichomes and reddish brown setae, tube conical, 3 x 3 mm, calyx lobes acuminate from widely ovate base, ca. 4 mm long, ca. 2 mm wide; petals deeply cymbiform, 8–11 mm long, 3–4 mm deep, base unguiculate and abruptly widened into two small, triangular teeth 2–3 mm from base, densely covered with glochidiate hairs and uniseriate gland-tipped trichomes on back, pure white; nectar scales ovate, narrowed above, ca. 4 mm long, ca. 3 mm wide, base incurved, back

with two elliptical, confluent nectar sacs at base, these distally red, with 3 vertical grooves below neck and with 3 united or separate carunculae (fragmented callus) ca 1,5 mm from scale neck, neck conspicuously thickened, slightly recurved, without filaments, laterally protracted into two small erect wings ca. 1 mm long and 0,5 mm wide; staminodia 2 per scale, ca. 5 mm long, base slightly dilated, filiform above, sparsely papillose to epapillose white; stamens with filaments 7–9 mm long, white, anthers 0,5 mm long and wide, yellowish brown. Fruit a widely cylindrical capsule with persistent calyx lobes, pedicel erect, ca. 25 mm long, capsule 8–15 mm long and ca. 8 mm wide at apex. Figure 2, 3 and 4.

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Literature cited

- Ayers T. 1999. Biogeography of Lysipomia (Campanulaceae), a high elevation endemic: An illustration of species richness at the Huancabamba Depression, Peru. *Arnaldia* 6: 13–28.
- Berry P. E. 1982. The systematics and evolution of Fuchsia sect. Fuchsia (Onagraceae). *Ann. Missouri Bot. Gard.* 69: 1–198.
- Dostert N. & M. Weigend. 1999. A synopsis of the *Nasa* triphylla complex (Loasaceae), including some new species and subspecies. *Harvard Papers in Botany* 4: 439–467.
- Rodríguez R., E. & M. Weigend. 2007. Loasaceae endémicas del Perú. *Rev. peruana Biol. Edición especial* 13(2):391–402s. [diciembre 2006]
- Skrabal J., H.-J. Tillich & M. Weigend. 2001. A revision of the *Passiflora lobbii* group (Passifloraceae), including some new species and subspecies. *Harvard Pap. Botany* 6(1): 309–339.
- Weigend M. 2000. No. 132. Loasaceae. – In: L. Andersson and G. Harling (eds.), *Flora of Ecuador* 64: 1–92.
- Weigend M. 2002. Observations on the Biogeography of the Amotape-Huancabamba Zone in Northern Peru. – In: K. Young, C. Ulloa U., J. L. Luteyn and S. Knapp (eds.), *Plant Evolution and Endemism in Andean South America*. *Botanical Review* 68: 38–54.
- Weigend M. 2004. Additional Observations on the Biogeography of the Amotape-Huancabamba Zone in Northern Peru – Defining the South-Eastern limits. *Revista Peruana de Biología* 11(2): 127–134.
- Weigend M. & E. Rodríguez R. 2002. Las especies arbustivas de *Nasa* Ser. *Grandiflorae* en el Norte de Perú, con la descripción de una especie nueva de la Abra de Barro Negro (Callacalla). *Arnaldia* 9(1): 7–20.
- Weigend M. & E. Rodríguez R. 2003. A revision of the the *Nasa stuebeliana* group [*Nasa* ser. *Saccatae* (Urb. & Gilg) Weigend, Loasaceae] with notes on morphology, ecology, and distribution. *Bot. Jahrb. Syst.* 124(4): 345–382.
- Weigend M. & E. Rodríguez R. 2006. *Ribes amazonica* spec. nov., la primera *Ribes* (Grossulariaceae) Peruana con inflorescencias erguidas. *Arnaldia* 12(1-2): 42–47. Weigend, M. & M. Gottschling 2006: Evolution of funnel-revolver flowers and ornithophily in *Nasa* (Loasaceae). *Plant Biology* 8: 120–142.

- Weigend M., E. Rodríguez R. & N. Dostert. 1998. *Nasa insignis* y *Nasa glandulosissima*, dos especies nuevas de *Nasa* con hojas peltadas. *Arnaldoa* 5: 151–157.
- Weigend M., T. Henning & C. Schneider. 2003: A revision of *Nasa* Ser. *Carunculatae* (Loasaceae subfam. Loasoideae). *Systematic Botany* 28: 765–781.
- Weigend M., E. Rodríguez R. & C. Arana (eds.) 2005a: Bosques relictos del NO de Perú y SO de Ecuador. *Revista Peruana de Biología* 12(2): 179–336.
- Weigend M., E. Rodríguez R. & C. Arana. 2005b. The relict forests of Northwest Peru and Southwest Ecuador. In: Weigend, M., E. Rodríguez R. and C. Arana (eds.), *Bosques relictos del NO de Perú y SO de Ecuador*. *Revista Peruana de Biología* 12: 185–194.
- Weigend M., A. Cano & E. F. Rodríguez. 2005c. New species and new records of the flora of the Amotape-Huancabamba Zone: Endemics and biogeographic limits. In: Weigend, M., E. Rodríguez R. and C. Arana (eds.), *Bosques relictos del NO de Perú y SO de Ecuador*. *Revista Peruana de Biología* 12: 249–274.
- Weigend M., N. Dostert, T. Henning, C. Schneider & E. Rodríguez R. 2006: Valid publication for 101 species and subspecies names of the genera *Nasa* and *Aosa* (Loasaceae: Cornales). *Revista Peruana de Biología* 13(1): 71–84.
- Young K. R. & C. Reynel. 1997. Huancabamba Region, Peru and Ecuador. Pages 465–469 in S.D. Davis, V.H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos and A.C. Hamilton (eds.), *Centers of Plant Diversity, a Guide and Strategy for their Conservation*, Vol. 3. The Americas. IUCN Publications Unit, Cambridge.