



A new white-flowered *Elleanthus* (Orchidaceae: Sobralieae) from the Andes of southern Ecuador and notes on hummingbird pollination of *Elleanthus scopula*

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Abstract

A new species of *Elleanthus* from southern Ecuador is described and illustrated here. *Elleanthus loxensis* is characterized by having ramified stems with coriaceous, plicate leaves and white flowers. Its ecological, morphological, and taxonomic traits are compared with other similar species within the genus and discussed here. Additionally, comments on the pollination of *Elleanthus scopula* are presented.

Key words: cloud forest, Loja, orchids, South America, Trochilidae, Zamora Chinchipe

Introduction

Elleanthus Presl (1827: 97) is a genus of the Orchidaceae currently ascribed to the Sobralieae Pfitzer (1887: 99) (Pridgeon *et al.* 2005, Chase *et al.* 2015) together with *Epilyna* Schlechter (1918: 374), *Sertifera* Lindley ex Reichenbach (1876: 63) and *Sobralia* Ruiz & Pavón (1794: 120) (Chase *et al.* 2015). Established by Carl Presl (1827), *Elleanthus* is characterized by the predominantly epiphytic plants, the caespitose cane-like habit; the distichous, plicate leaves; the conspicuous, sometimes bright-colored floral bracts complimenting mostly attractively colored flowers; with sepals and petals that are free to the base; and the saccate base lip with two globose calli basally (Garay 1978, Dodson 2001, Pridgeon *et al.* 2005, Dodson & Luer 2010).

Elleanthus is distributed from Mexico and the West Indies to Bolivia and southern Brazil, with the highest species diversity across the Andes including Ecuador. They are often found growing in diverse habitats and forest types, ranging from coastal and lowland forests near sea level to wet cloud forests and subparamo up to elevations around 3000 m (Pridgeon *et al.* 2005, POWO 2024). At present, *Elleanthus* comprises 128 accepted species (Dodson & Luer 2010, Chase *et al.* 2015, POWO 2024), 62 presently found within Ecuador (POWO 2024). The majority of Ecuadorian species (36) were described during the 20th century; with 22 described during the 19th century, and only four species were described during the 21st century (Tropicos.org 2024, POWO 2024).

A complete taxonomic classification or taxonomic treatment for the species within *Elleanthus* has not yet been proposed. The infrageneric treatment published by Garay (1978), in which eight separate sections were recognized, was insufficient in establishing a better intrageneric understanding of *Elleanthus* due to its complexity and lack of clarity (Dodson 2001, Dodson & Luer 2010, Dudek *et al.* 2017). The few studies in which *Elleanthus* appears are generally regional surveys that include the other genera from the family Orchidaceae, hindering a specific focus on intrageneric species diversity and relation. Over the last seven decades, examples of these surveys include studies in Bolivia (Vásquez & Ibisch 2004), Costa Rica (Hammel *et al.* 2003), Ecuador (Garay 1978, Dodson & Luer 2010), Peru (Schweinfurth 1958, Bennett & Christenson 1993, 1995, 1998) and Venezuela (Foldats 1969, Dunsterville & Garay 1959, 1966, 1972, 1976, Romero-González & Carnevali Fernández-Concha 2000).

Orchid pollination is known to be performed by insects and less commonly by birds (van der Pijl & Dodson 1969, Nilsson 1992, Roberts & Dixon 2008). In the Neotropics, the ornithophilous species, including the genus *Elleanthus*, are predominantly pollinated by hummingbirds (Faegri & van der Pijl 1979, Dressler 1981, 1993, 2006, van der Cingel 2001, Neubig *et al.* 2015, Karremans 2023), which are attracted by the nectariferous, bright-colored flowers (usually colored brilliant pink, orange or red) that have distinct tubular shapes (van der Pijl & Dodson 1969, Karremans 2023). Van der Pijl & Dodson (1969) and van der Cingel (2001) mentioned in particular the pollination by hummingbirds of *Elleanthus aurantiacus* and *E. capitatus* in Ecuador, whereas Nunes *et al.* (2016) described thoroughly the pollination biology of two Brazilian species, *E. brasiliensis* and *E. crinipes*. All these species exhibit similar floral modifications that aid in hummingbird pollination.

The new species described in this manuscript was first mentioned in a note by Dodson & Luer (2010) as an unidentified taxon, initially identified in error as *Elleanthus scopula* by Dodson (2001). During botanical surveys over the last three years, the authors discovered several more specimens of this taxon in the Tapichalaca Reserve of Fundación Jotococo and the adjacent regions of southern Ecuador. After thoroughly comparing these specimens with other known members of the genus *Elleanthus* from Ecuador and neighboring countries, it was concluded that this material does belong to a new species here proposed as *Elleanthus loxensis* *sp. nov.* Additionally, during an expedition to the Sumaco volcano in northeast Ecuador, the effective pollinator was seen visiting the flowers of *Elleanthus scopula*, notes and observations are presented in this manuscript.

Materials and methods

A list of accepted names (110 species) reported for Ecuador and its neighboring countries (Bolivia, Brazil, Colombia, Peru, and Venezuela) has been compiled using online databases POWO (<https://powo.science.kew.org/>) and Tropicos (<https://tropicos.org/home>). The original descriptions of all taxa reported for those countries were reviewed and supplemented by digital images of the available type specimens through Global Plants on JSTOR (<https://plants.jstor.org/>) and GBIF (<https://www.gbif.org>). This was done also for similar species including *Elleanthus albiflorus* Dudek, Baranow, Kolanowska & Rykaczewski (2017: 257), *E. maculatus* Reichenbach (1863: 482) and *E. scopula* Schlechter (1912: 457) were examined online through. The taxonomic key to the Ecuadorian species of *Elleanthus* by Dodson & Luer (2010) was consulted to know the phylogenetic relationships of the new species. All specimens identified as *E. scopula* stored at AMES, MO and QCA herbaria (acronyms by Thiers, 2024) were examined online through Data Web Ecuador (<https://bioweb.bio/portal/>), Harvard University Herbaria (https://kiki.huh.harvard.edu/databases/specimen_index.html) and Tropicos (<https://tropicos.org/home>). The first author revised through photographs all unidentified specimens of *Elleanthus* and vouchers identified as *E. maculatus* deposited at the LOJA herbarium to ensure that identifications were accurate.

The measurements of the vegetative and floral parts were made from living material. The fresh flowers were stored in 70% ethanol and glycerol. Photos of dissected specimens were taken with a Panasonic FZ300 camera with Raynox DCR-250 Super Macro lens (Figure 5) and a Nikon D5100 camera with an AF-S DX Micro Nikkor 40mm f/2.8G lens. The distribution map was prepared using ArcGIS Desktop 10.3. The extent of occurrence (EOO) and area of occupancy (AOO) for this species were calculated using the GeoCAT tool (Bachman *et al.* 2011), and the IUCN criteria were evaluated to determine the conservation status (IUCN 2024). The geographic coordinates of the specimens were omitted for conservation reasons; however, detailed information on the specimens examined can be consulted in the herbarium vouchers.

Taxonomy

Elleanthus loxensis M.M.Jiménez & Iturralde, *sp. nov.* (Figures 1–2, 4–6)

Type:—ECUADOR. Zamora Chinchipe: Tapichalaca Biological Reserve, Yangana-Valladolid road, 2618 m, (coordinates omitted for conservation reasons; detailed data on the type specimen), flowered in cultivation in Loja, 8 March 2024, *M.M. Jiménez 2089* (holotype: HUTPL 15145!).

Elleanthus loxensis is most similar to *E. maculatus* but it is distinguished by the stems branching along its length (*vs.* branching only from the base), the white flowers (*vs.* purple) with shorter spatulate-lanceolate sepals (7.5–8.3 × 3.5–3.6 mm *vs.* oblong petals 14–18 × 2–3 mm), the smaller, membranaceous, lacinate lip (9.0–9.9 × 7.3–10.1 mm *vs.* fleshy, fimbriate lip, 17 × 10 mm), and the base with subreniform calli (*vs.* obpyriform, globose calli).

Description:—Epiphytic or rarely terrestrial, sympodial, scandent herb, sometimes hanging and arching because of weight, up to 90–100 cm tall including inflorescence. *Rhizome* short, up to 12 mm long between stems, climbing, thick. *Roots* 2.0–7.0 mm in diameter, brown, tomentose. *Stems* 25–75 cm long, 2.0–3.5 mm in diameter, terete, slightly arcuate, branching from the base and/or along its length; branches around 30 cm long, often branching again, sometimes rooting from the nodes of the base, 2–4 internodes below the leaves, covered by non-foliar sheaths, 22.9–36.8 × 2.0–3.6 mm, flecked, becoming dry-papyraceous when dry. *Leaves* 3–8, aggregate at the apex of stems, coriaceous, the upper ones smaller; *sheathing petioles* 25.0–35.4 × 2.8–4.4 mm, tubular, smooth, green, flecked; *blades* 4.9–13.4 × 1.0–2.9 cm, plicate, 5–7 strongly nerved, canaliculate along the veins, lanceolate to narrowly lanceolate or oblong-lanceolate, apex acute, slightly attenuate, medium green on both sides, margins entire, thickened, base sessile, cuneate. *Inflorescence* 6.0–9.3 × 3.3–5.5 cm, in a conical to cylindric raceme, flowers opening first from near the apex; *peduncle* 1.7–2.9 cm long, short; *basal bract* 1 cymbiform, 3.8–5.8 cm long, foliaceous, pale green, flecked, longer than the peduncle, enveloping the base of the rachis for 7–9 mm, base elliptic when spread, apex narrowly lanceolate when spread, obtuse; *floral bracts* 1.1–4.7 × 0.3–1.2 cm, tubular, pale green, lanceolate to the base, long-acuminate to the apex, flecked, the lower bracts longer than the upper. *Flowers* 1.5–1.8 × 0.8–1.1 cm, white, lustrous; *ovary* 5.2–6.8 × 2.1–2.4 mm, green, densely flecked. *Sepals* concave, mucronate at the apex, slightly flecked to the midvein, margins entire, *dorsal sepal* 7.3–8.3 × 3.5–3.6 mm, 7-veined, elliptic, acute; *lateral sepals* 7.9–9.8 × 2.5–3.6 mm, free, 7-veined, keeled dorsally, narrowly ovate, oblique, acute. *Petals* 7.5–8.9 × 2.5–2.9 mm, 5-veined, spatulate-oblong-lanceolate, centrally channeled, canaliculate dorsally, margin irregularly sinuate in the apical third. *Lip* 9.0–9.9 × 7.3–10.1 mm, 13-veined, basally saccate, narrowing to the middle; blade cuneate-flabellate, suborbicular when expanded, margin lacinate, emarginate at the apex; *calli* 2, 2.1 × 3.6 mm, each one subreniform. *Column* oblong, 4.4–6.0 × 2.6–3.5 mm, complanate, with two short, obtuse, triangular wings to the apex, ventrally concave with winged margins; *clinandrium* not cucullate, minutely sinuate with two subrectangular and falcate wings to the distal margin; stigma ventral, semicircular, rostellum reniform, rostellar flap lingulate; foot 1.5 mm long. *Anther* terminal, 2.0 mm wide, rectangular, purple. *Pollinarium* 8 narrowly obovoid pollinia, 1.6 mm wide, brownish green.

Distribution and ecology:—*Elleanthus loxensis* is primarily known from the cloud forests facing the inter-Andean valleys of the Loja canton in the province of Loja and the high eastern slope of the Western Ecuadorian Andes of Zamora Chinchipe province, south of Ecuador (Figures 3, 4). The species grows as an epiphyte on tree trunks covered in mosses or terrestrially in disturbed habitats at elevations between 2200 to 2800 m. Other species of orchids such as *E. maculatus*, *Epidendrum dalessandroi* Hágsater & Dodson in Hágsater & Sánchez-Saldaña (2001: 433), *Masdevallia deformis* Kraenzlin (1921: 428), *Scaphyglottis bicornis* (Lindley 1844: 41) Garay (1967: 255) and *Stelis neowerneri* Shaw (2014: 78) were found growing sympatrically with *E. loxensis*. In this area, the local flora is dominated by *Centropogon densiflorus* Benth (1844: 138) (Campanulaceae), *Gynoxys* sect. *Praegynoxys*, *sensu* Escobari *et al.* (2023: 85) (Asteraceae), *Macleania farinosa* Mansfeld (1925: 436), *Psammisia fissilis* Smith (1950: 372), *Sphyrospermum cordifolium* Benth (1846: 222) and *Themistoclesia recondita* Smith (1953: 469) (Ericaceae).

Occasionally, *Elleanthus loxensis* was also found growing terrestrially in the El Madrigal Reserve of Podocarpus National Park (Figure 5) together with *Gynoxys reinaldi* Cuatrecasas (1951: 15) (Asteraceae), *Hedyosmum* sp. (Chloranthaceae), *Macleania poortmanni* Drake (1889: 74), *M. salapa* (Benth 1844: 141) Hooker ex Hoerold (1909: 269) (Ericaceae) and *Telipogon ionopogon* Reichenbach (1876: 27) (Orchidaceae). Its terrestrial form was also seen in the La Argelia-La Palma road which occurs along the crest of the mountain range just southwestern of the Loja basin within the province of Loja.

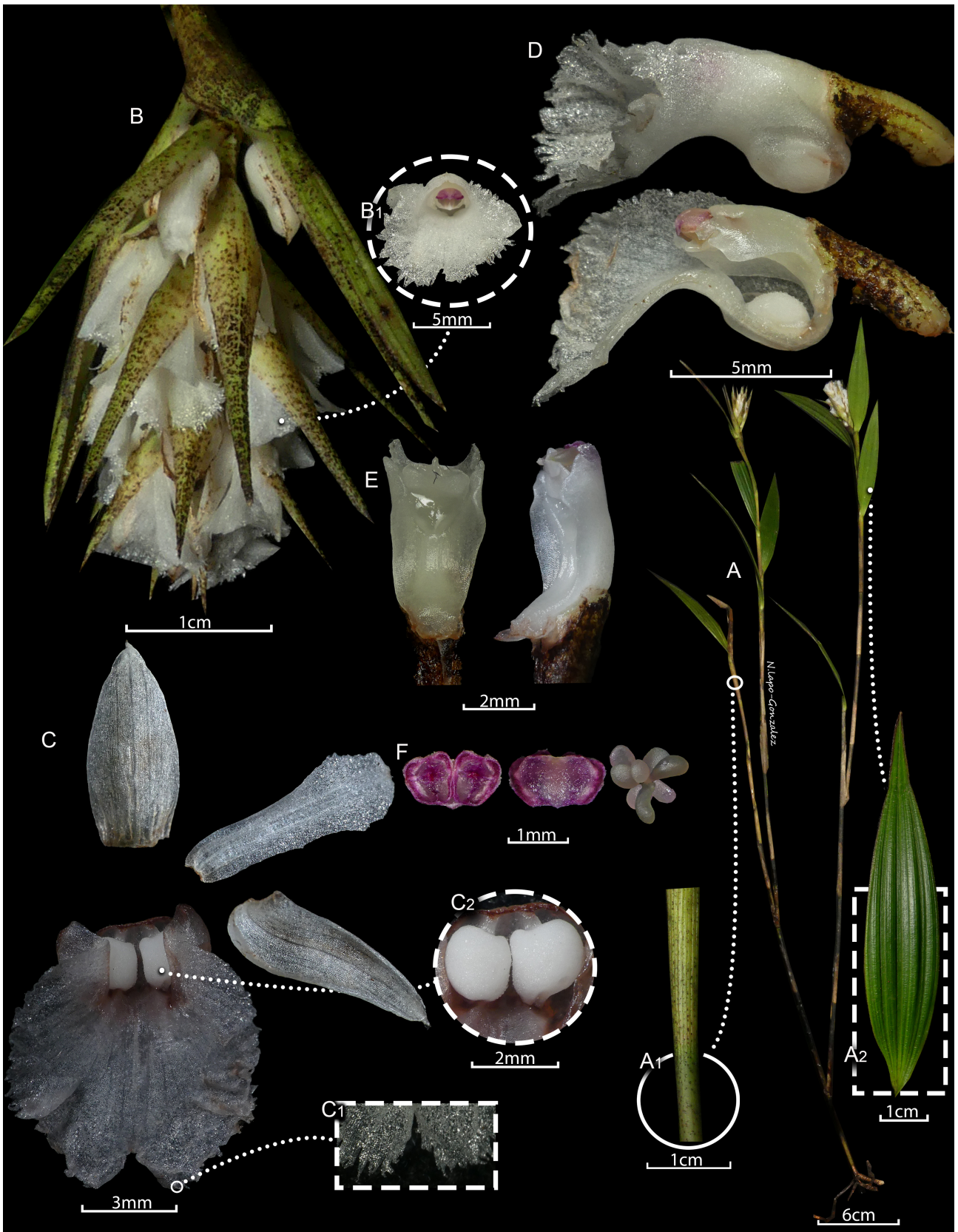


FIGURE 1. Lankester Composite Dissection Plate (LCDP) of *Elleanthus loxensis*. **A.** Habit with a close-up of the internode of a branch (A1) and a leaf in adaxial view (A2). **B.** Detail of the inflorescence with a flower in frontal view (B1). **C.** Dissected flower with a close-up of the apical margin (C1) and corpuscles of the lip (C2). **D.** Lip, column and ovary in lateral views with a longitudinal section of the lip showing the column and corpuscles. **E.** Column in ventral and $\frac{3}{4}$ views. **F.** Pollinarium and anther in adaxial and abaxial views. Elaborated by Nadia Lapo-González based on photographs of the type.

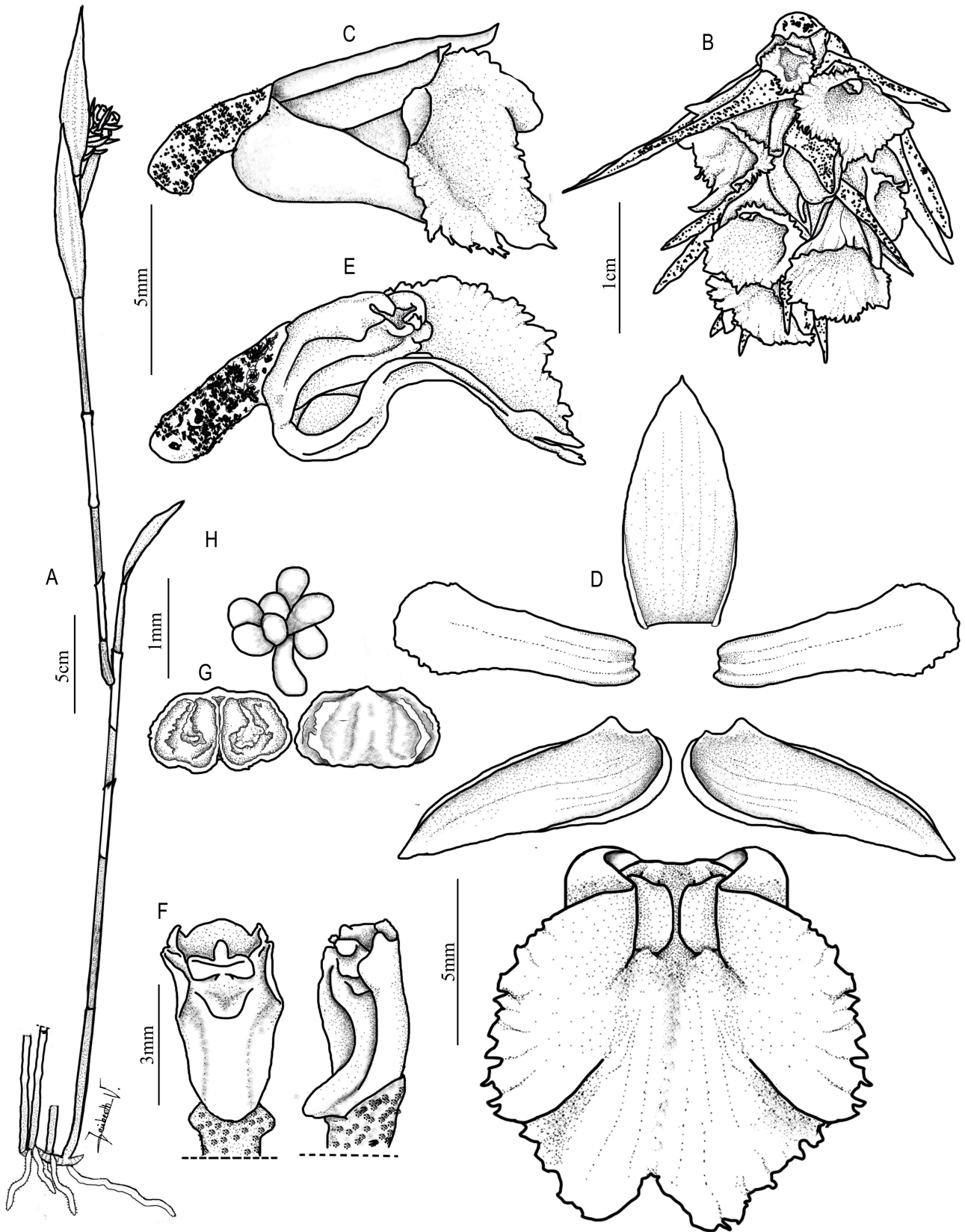


FIGURE 2. *Elleanthus loxensis*. A. Habit. B. Inflorescence. C. Flower in lateral view. D. Dissected perianth. E. Longitudinal section of the lip showing the column and ovary. F. Column, ventral and $\frac{3}{4}$ view. G. Anther in abaxial and adaxial view. H. Pollinarium. Drawing by L. Vélez-Abarca from the plant that served as the holotype.

Etymology:—The specific epithet refers to its occurrence within the region of Loja (formerly known as Loxa in ancient Spanish). Most of its currently known geographic distribution falls within this municipality in southern Ecuador.

Additional specimens examined (paratypes):—ECUADOR. Loja: Cerro Toledo, cerca de Yangana, 2498 m, 24 February 2024, *M.M. Jiménez, G.A. Iturralde & H. Garzón-Suárez* 2233 (HUTPL 15146!); oeste de Loja, cerca del Cerro Uritusinga, vía Loja-La Palma, 2790 m, 22 February 2024, *M.M. Jiménez, G.A. Iturralde & H. Garzón-Suárez* 2196 (HUTPL 15147!); Reserva Madrigal del Podocarpus, sureste de Loja, 2445 m, 16 Marzo 2024, *M.M. Jiménez & N. Espinosa-Ortega* 2278 (HUTPL 15148!); Zamora Chinchipe: Area of Estación Científica San Francisco, road Loja-Zamora, ca. 35 km from Loja, near plataforma-open, 2200 m, 22 April 2007, *F. Werner, G. Mendieta, K. Diertl & A. Simon* 2195 (QCA 68801!); Eastern side of pass on road from Yangana to Valladolid, 2700 m, 23 Mar 1985, *A. Hirtz, C. Luer, J. Luer & W. Flores* 2309 (MO 3743473!); Loja to Zamora along new road from San Francisco to pass, 2500 m, 21 May 1988, *A. Hirtz* 3855 (MO 3743472!).

Conservation status:—Seven localities of *Elleanthus loxensis* were identified (Figure 3) across an extended occurrence (EOO) of 520 km², with an area of occupancy (AOO) of 30 km². Habitat fragmentation due to deforestation for cattle grazing, infrastructure works, and pine plantations are a dominant threat to these natural areas, showing a significant decline in suitable habitats for *E. loxensis* to grow. The new species has shown a relatively low abundance *in situ*, and combined with its disappearing habitat the new species should be considered as Vulnerable (VU) in accordance with the IUCN (2024) criteria B2ab (v,iii) and C1. Despite this, fortunately, *Elleanthus loxensis* is found in the El Madrigal of Podocarpus and Tapichalaca reserves, and its occurrence is expected throughout the nearby Podocarpus National Park, by which the conservation of this species has hope.

Taxonomic discussion:—*Elleanthus loxensis* is most similar to *E. maculatus*, both of which show a slender habit (as opposed to robust); inflorescences that are longer than broad; of which the spathes are small and the column without a hood over the anther (Figures 6–7). The new species is distinguished from the latter by the shorter stems branching along its length. In contrast, *E. maculatus* can grow up to 40 cm tall, and branches only from the base. Additionally, *E. loxensis* is distinct for having smaller, lanceolate leaves (5–7 veined, acute at the apex, 4.9–13.4 × 1.0–2.9 cm *vs.* elliptic leaves 9–11 veined, acuminate at the apex, 15–20 × 1.5–5.5 cm); the shorter inflorescences (6.0–9.3 cm long *vs.* 5–12 cm long); the single (*vs.* up to three), shorter basal bract (3.8–5.8 cm long *vs.* 8.6 cm long) with lanceolate apex (*vs.* narrowly triangular to the apex); the shorter floral bracts (11–47 mm long *vs.* 25–65 mm long); the shorter, white flowers of up to 1.7 cm long (*vs.* purple flowers up to 2.6 cm long); the shorter and wider petals that are spathulate-lanceolate in outline (7.5–8.3 × 3.5–3.6 mm *vs.* 14–18 × 2–3 mm with oblong outline); the smaller lip (9.0–9.9 × 7.3–10.1 mm *vs.* 17 × 10 mm) with a membranaceous texture (*vs.* fleshy), broader width in the middle (*vs.* narrower), the lacinate margin (*vs.* fimbriate), and the base with subreniform with separated calli (*vs.* obpyriform with globose calli); the much shorter and oblong column (4.4–6.0 mm long *vs.* 10–17 mm long and elongate column); and the pollinia being brownish green (*vs.* dark purple to blue) (Garay 1978, Valencia 2020). Other important features observed are the clinandrium with rectangular and falcate wings at the apex (*vs.* quadrate) and the lingulate rostellar flap (*vs.* short triangular) (Figure 7).

The new species is also similar to *Elleanthus scopula*, by having the same branching habit (Figure 6), but differs by the larger, acuminate, 3-veined leaves (4.9–13.4 × 1.0–2.9 cm *vs.* smaller, acute, 5–7-veined leaves), 4.0–9.0 × 0.7–1.4 cm); the longer, conical inflorescences (up to 9.3 cm *vs.* up to 2.5 cm, subglobose); and the white flowers (*vs.* purple). Additional differences can be seen in the longer floral bracts (up to 47 mm long *vs.* up to 25 mm long); the spathulate-lanceolate petals (*vs.* oblong-ligulate) that measure 3.5–3.6 mm wide (*vs.* 2.0–3.0 mm wide), the membranaceous lip (*vs.* fleshy) with lacinate margin (*vs.* finely dentate), and emarginate apex (*vs.* shortly apiculate); and the shorter floral column (4.4–6.0 mm long *vs.* 8.0 mm long) (Garay 1978).

Another species where the stems branch throughout and exhibit white flowers is the Peruvian *Elleanthus albiflorus* (Figure 6). *Elleanthus loxensis* differs from *E. albiflorus* by the larger, acute leaves (4.9–13.4 × 1.0–2.9 cm *vs.* acuminate leaves, 3.0–7.5 × 0.8–11.0 cm); the longer, congested inflorescence (up to 9.3 cm long *vs.* subax inflorescences of up to 3 cm long), with a longer basal bract, (3.8–5.8 cm long *vs.* 2.1 cm long); larger floral bracts (11–47 × 3–12 mm *vs.* 15–18 × 3–4 mm); a longer dorsal sepal that is 7-veined (7.3–8.3 mm long *vs.* 3-veined and 6.0 mm long); longer lateral sepals, similarly 7-veined (7.9–9.8 mm long *vs.* 5–6 veined lateral sepals measuring 6.8 mm long); larger petals (7.5–8.9 × 2.5–2.9 mm *vs.* 6.0 × 1.2 mm); the larger lip that is flat between the basal and apical parts (9.0–9.9 × 7.3–10.1 mm *vs.* 6.0 × 3.5 mm with a thin transverse thickening between the concave part and the apical part); the subreniform calli (*vs.* ovoid); and the longer column (4.4–6.0 mm long *vs.* 4.0 mm long).

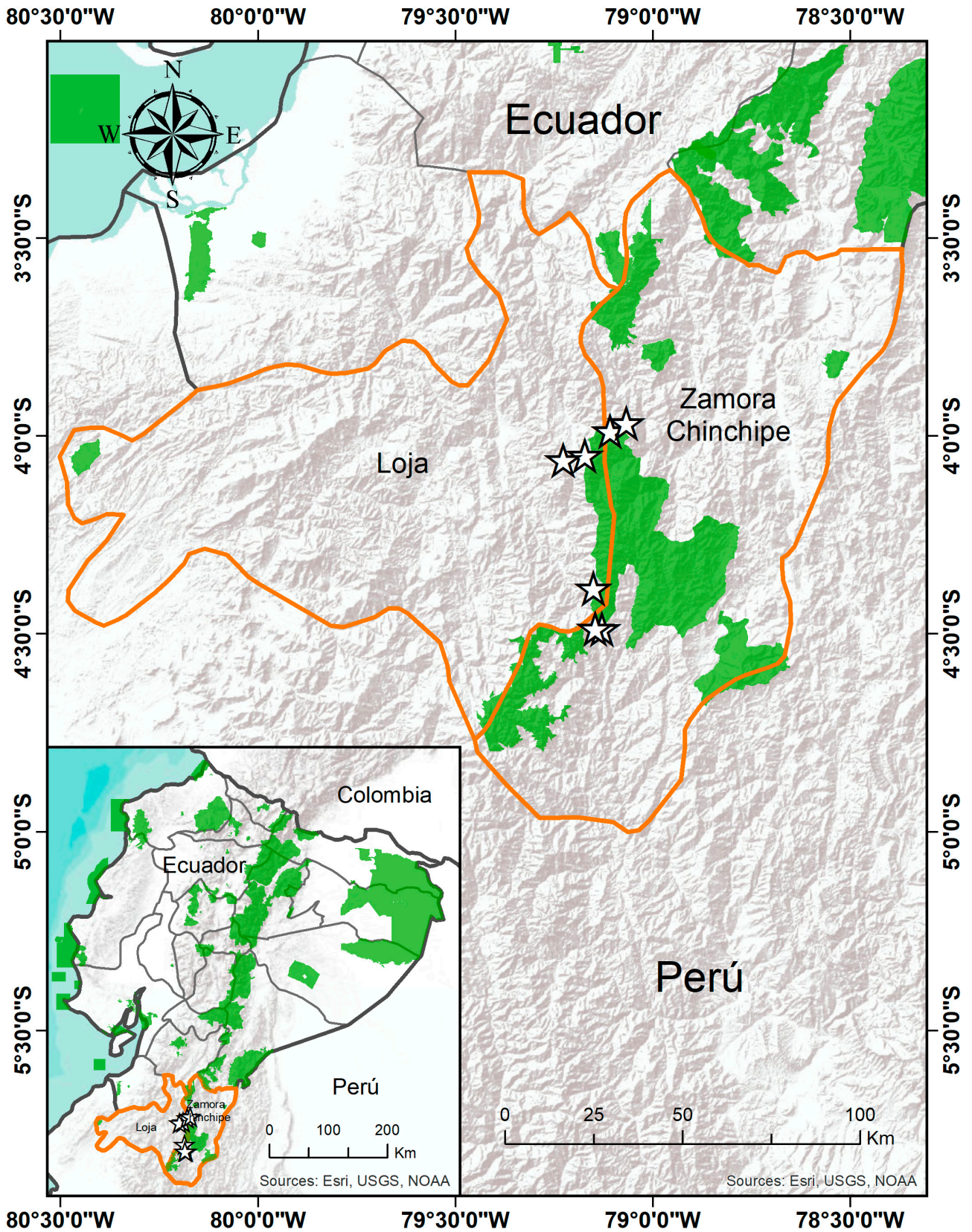


FIGURE 3. Distribution of *Elleanthus loxensis* in the southern region of Ecuador.

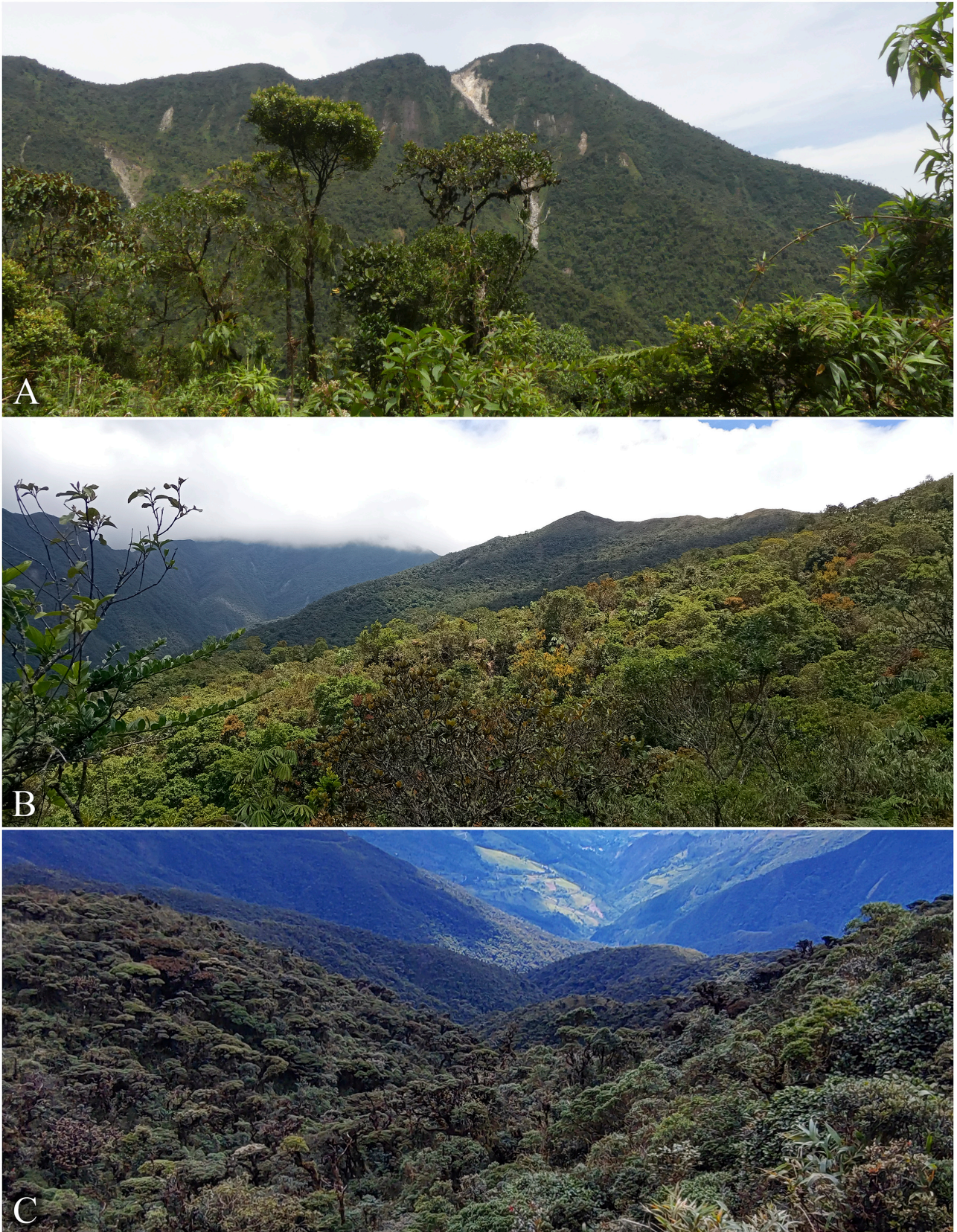


FIGURE 4. Montane cloud forests in southern Ecuador. **A.** Tapichalaca Reserve. **B.** El Madrigal of Podocarpus Reserve. **C.** Slopes of Cerro Toledo near Yangana. Photos: by Marco M. Jiménez (A, B) and Henry Garzón-Suárez (C).

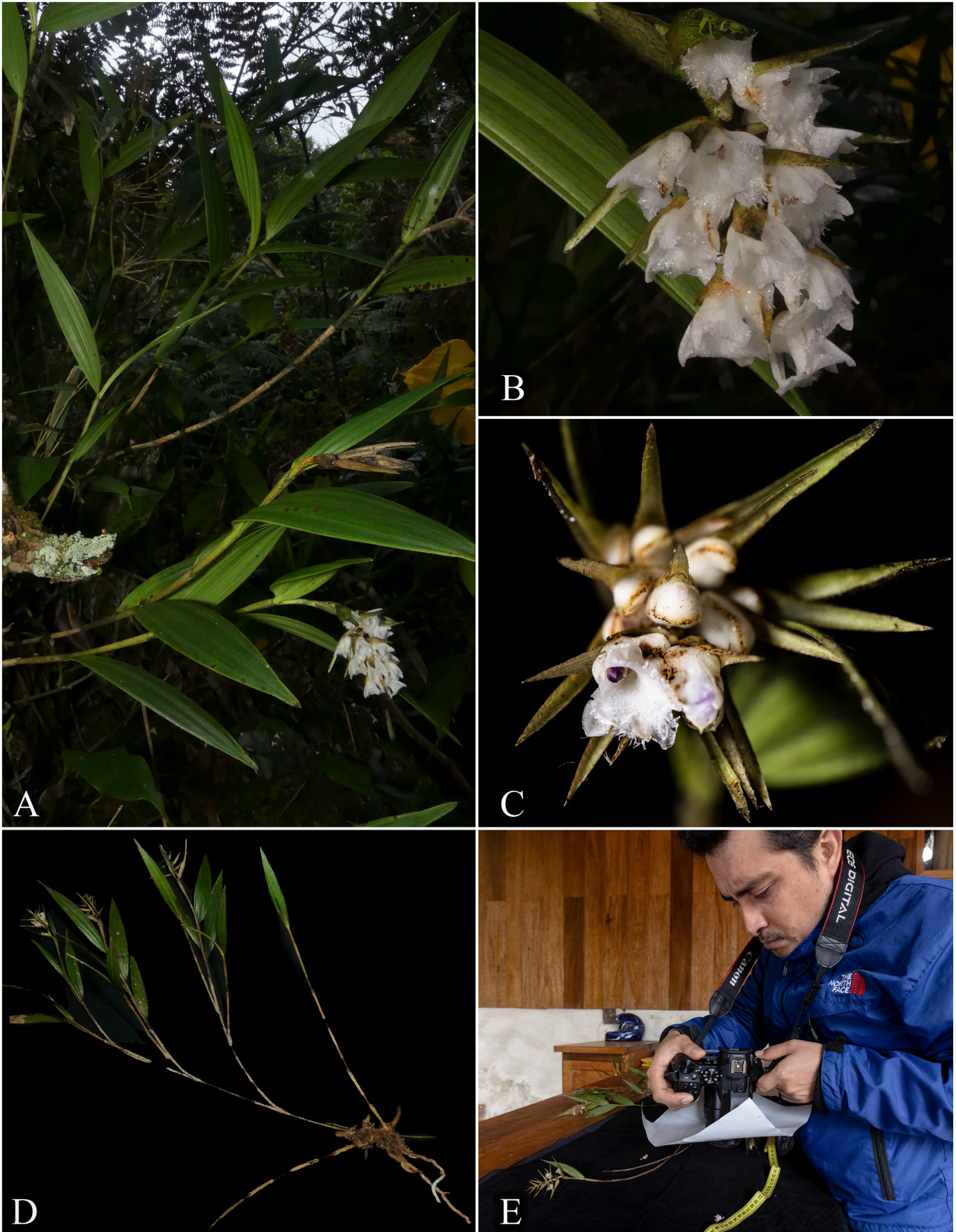


FIGURE 5. *Elleanthus loxensis*. **A, B.** *In situ* photographs in the El Madrigal of Podocarpus Reserve. **C, D.** Plant in flower in Tapichacala Reserve. **E.** The first author is photographing the new species in Tapichalaca Reserve. Photos: by Marco M. Jiménez (A, B) and James H. Muchmore Jr. (C–E).



FIGURE 6. Similar species of *Elleanthus* with ramified stems. **A.** *Elleanthus loxensis*. **B.** *Elleanthus maculatus* **C.** *Elleanthus albiflorus*. **D.** *Elleanthus scopula*. Photos: by Rudy Gelis (A), Marco M. Jiménez (B), Henry X. Garzón-Suárez (C) and Luis Yupa (D).

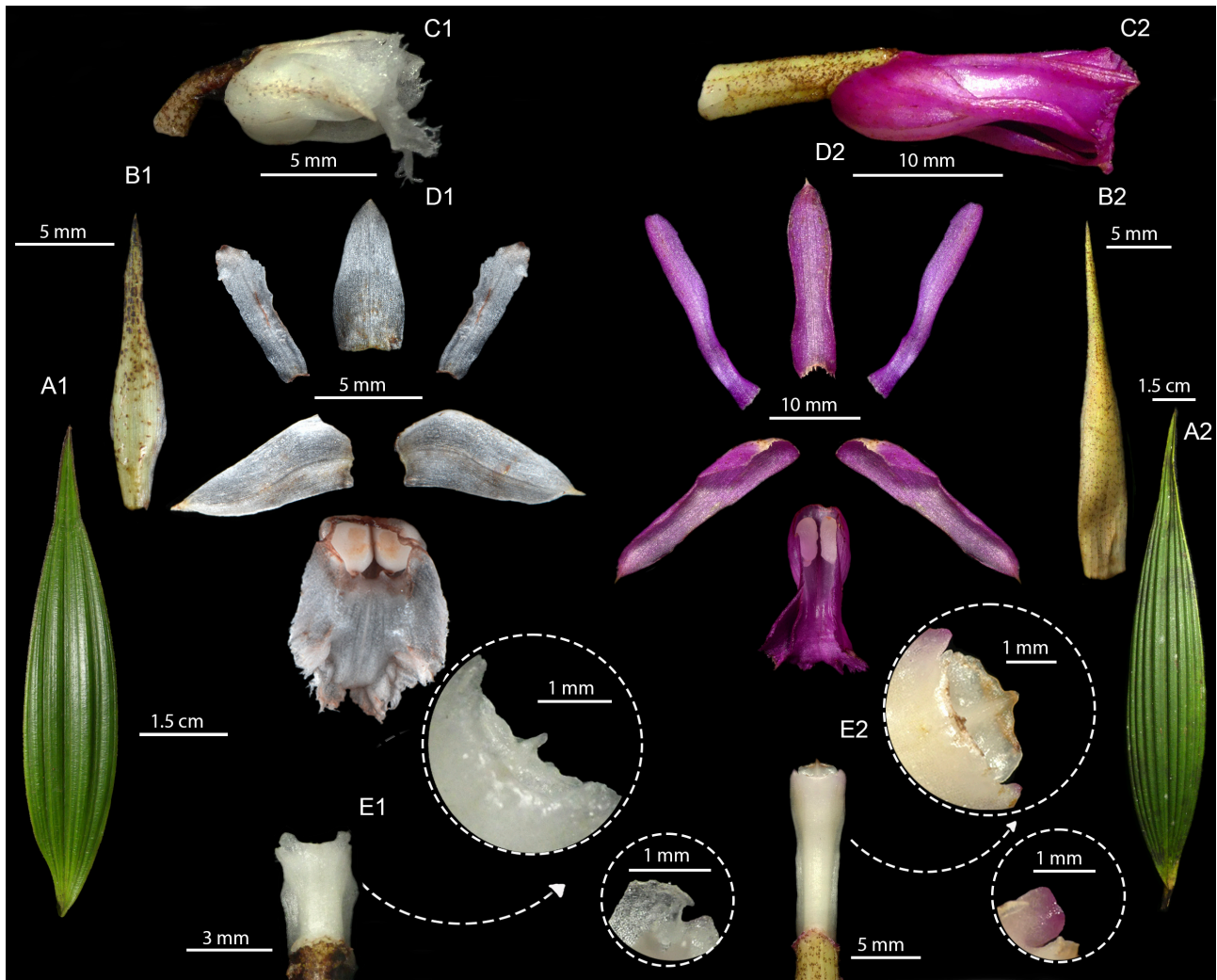


FIGURE 7. Comparison of *Elleanthus loxensis* based on the holotype and *M.M. Jiménez 2196* (left) and *E. maculatus* based on *M.M. Jiménez 2285* and *2291* (right). **A.** Leaves. **B.** Floral bracts. **C.** Flower in lateral view. **D.** Dissected flower. **E.** Column with a close-up of the apex and wings of the clinandrium. Photos by Marco M. Jiménez and Henry X. Garzón-Suárez (B1, D1).

In addition to morphological differences, there are also differences in their distribution and habitat. *Elleanthus loxensis* grows at lower elevations from 2200 to 2800 m and is restricted to the warmer montane forests of southern Ecuador in the provinces of Loja and Zamora Chinchipe, while according to Dodson & Luer (2010) and Valencia (2020), *E. maculatus* grows at slightly higher altitudes from 2400 up to 3300 m with a wider distribution across the montane and high Andean forests and paramos from Costa Rica to Bolivia. *Elleanthus scopula* also grows at relatively higher elevations ranging from 2700 to 3500, where it is seen mostly as a terrestrial orchid in high Andean forests and paramos widely distributed from Costa Rica to Bolivia (Dodson & Luer 2010). This wide distribution, however, may inadvertently incorporate some other (erroneously identified) species, as was seen in some accessions of *E. loxensis* having been labeled in herbaria as “*E. scopula*”. To the south, the Peruvian endemic *E. albiflorus* also grows as a terrestrial orchid but is seen in lower premontane forests at elevations not exceeding 2100 m. The distribution is much more limited in lateral extent, where it appears restricted to the department of Pasco, central Peru (Dudek *et al.* 2017).

Pollination notes on *Elleanthus scopula*

One of the authors (LAS) observed two species of hummingbirds, *Metallura tyrianthina* Loddiges (1832: 6) and *Chalcostigma herrani* DeLatre & Bourcier (1846: 309) (young male), visiting and feeding from the flowers of *Elleanthus scopula* (Figure 8). The observations were made along the upper flanks of the Sumaco Volcano (Sumaco Napo-Galeras National Park), during an ascent for the Christmas Bird Count, on 21 December 2022. Sumaco is an active stratovolcano in the northern sub-Andean zone of Ecuador with a height of 3830 m above sea level (Salgado-

Loza *et al.* 2021). According to Lozano *et al.* (2020) the ecosystem between 3200 and the summit is a paramo, characterized by erect shrubs and herbs, tussocks, few cushions, and various types of rosettes. The most diverse families are Asteraceae, Orchidaceae, Cyperaceae, among others (Lozano *et al.* 2020), and it was at these elevations *Elleanthus scopula* was registered (Dodson & Luer 2010).



FIGURE 8. Hummingbirds visiting *Elleanthus scopula*. **A, B, C.** *Metallura tyrianthina* (female) with pollinarium in its bill. **D, E.** *Chalcostigma herrani*. Photos by Luis Salagaje.

Individuals of *Metallura tyrianthina* (male and female) were seen carrying pollinarium of *E. scopula* attached to their bills after visiting the flowers. One individual of *M. tyrianthina* was observed actively removing the pollinarium from the flower (Figure 8). Observations of both hummingbirds were made between the hours of 02:17 pm to 02:41 pm at the unusual elevation of 3500 m and were limited because of the fog and strong winds. The pollinarium removal in *E. scopula* occurred as follows: the bird first perched on the stem of the orchid; after which it inserts its bill into the floral tube to probe the nectar at the bottom of the nectar chamber while during this insertion it touches the pollinaria with the tip of its bill and becoming attached to it (Figure 8). The time that the birds remained perched and feeding on the flowers was between one and two minutes. During the prolific flowering of *E. scopula*, it was additionally observed that little to no other [competing] species were in bloom, meaning that the orchid provided was the only source of nectar within the habitat. It was also observed that the two species of hummingbirds were competing to access those flowers. These observations suggest that the two species of hummingbirds are likely to be essentially important to the pollination of *E. scopula*.

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