



Ainea konzattii (Iridaceae: Tigridieae) revisited: description of a new variety

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Abstract

A new variety of *Ainea konzattii* is described and illustrated, a key to recognize the two varieties of the species and a distribution map of both taxa are included.

Keywords: Coixtlahuca, Oaxaca, Tepelmeme Villa de Morelos

Introduction

Ainea konzattii (Foster 1950: 106) Ravenna (1979: 468) was first collected in 1907 by the Italian-Mexican professor Casiano Konzatti, an enthusiastic botanist who made important contributions to the study of Mexican flora and who for many years lived in the city of Oaxaca (Beltrán, 1951). The species was formally described 43 years later (as *Sphenostigma konzatti*) by Robert Crichton Foster (1950), curator of the Gray Herbarium at Harvard University. There were no further records of this species after Konzatti's collection. It would take another 67 years for the species to be collected again, in 1974, by E. Norman. Then, starting with this last collection by Norman approximately 25 km east of the type locality, additional specimens were gradually added to herbaria. These new collections came from the District of ETLA (mostly close to the type locality) and from the District of Juxtaluaca, both in the state of Oaxaca (see specimen list below).

Based on examination of the type specimen and his own field work, Pierfelice Ravenna (1979) transferred the species to the new monotypic genus *Ainea*, on the grounds that its combination of characters did not conform to *Sphenostigma* Baker (1877: 76) or other genera within Iridaceae as then understood.

Despite the fact that the generic name *Ainea* Ravenna (1979: 467) comes from the Greek word Αἶνος = praise in reference to the beauty of its flowers, the specimens of the only species of the genus are scarce and rather inconspicuous, mainly due to the small size of the plants and the color and short duration of their evanescent flowers.

Prior to the collection reported in this paper, *Ainea konzattii* was thought to be endemic to three areas of the state of Oaxaca (Figure 1). Two of these areas are in the municipality of Santiago Tenango, Oaxaca: one being the forested hills located between la Carbonera and Santiago Tenango (the type locality) and the other the hills between San Juan del Estado and San Miguel Aloapam, approximately 25 km east of Santiago Tenango. The third area is in the district of Juxtaluaca, approximately 100 km west of Santiago Tenango, where five collections were made by Jerónimo Reyes Santiago in the years 1988–1990 in pine-oak woodland and rosetophilous scrub habitats. It is a rare species, although it is usually abundant in the places where it grows (Espejo-Serna & López-Ferrari, 1996, 2022; Espejo Serna, 2012).

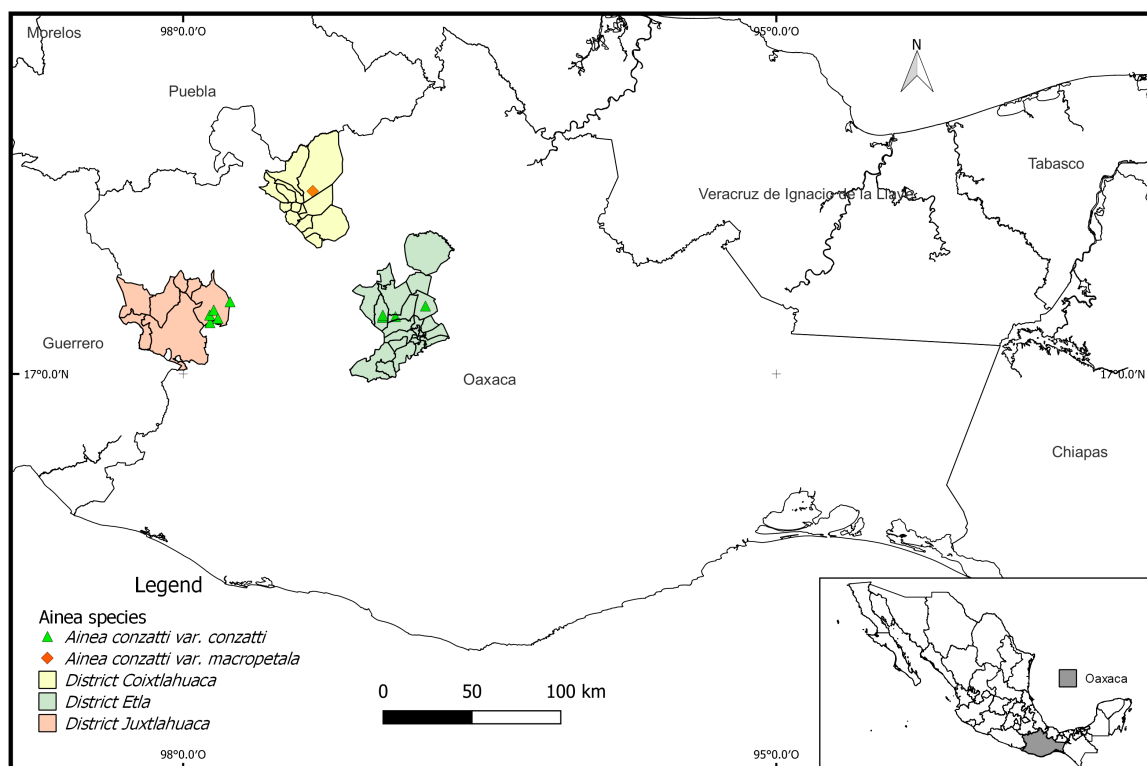


FIGURE 1. Map of known distribution of *Ainea konzattii* var. *konzattii* and *Ainea konzattii* var. *macropetala*.

Phylogenetic analysis of five plastid DNA regions by Goldblatt *et al.* (2008) indicated that the genus *Ainea* and its only species are included within *Tigridia* Jussieu (1789: 57). However, Munguía-Lino *et al.* (2015) noted that the generic limits in Tigridieae are still under debate, so they maintain *Ainea* as an independent genus, as we do here.

From an ecological point of view, one of the underlying causes for the scarce collections of *Ainea konzattii* is that it grows in little-studied grasslands and among the leaf litter in temperate forests. Despite being poorly collected, Mexican temperate intertropical grasslands, particularly those in northern Oaxaca, contain high plant richness (Martorell *et al.* 2022). At the very least, 800 vascular plant species grow in the just 70 km² covered by the Oaxacan grasslands (Martorell, unpublished data). These systems include the only world-record of plant diversity held by Mexico, with up to 25 plant species rooted in a 10 × 10 cm square and are home to a few microendemic species. Over 20 species protected by Mexican or international laws also occur there (Martorell *et al.* 2017, 2022).

During review of diverse monocot material for the project Plant Diversity at the Southern Limits of North American Grasslands, López-Ferrari and Espejo-Serna noted the unusually large inner tepals of a specimen of *Ainea* collected by Yesenia Mora, Diego García and Carlos Martorell on 9 July 2022. Separately, the last author of this paper noted the same unusual morphology in photographs taken by Martorell on 9 July 2022 and uploaded to Naturalista/iNaturalist, a free-access platform for sharing wildlife observations (Martorell 2022).

Further analysis of floral attributes demonstrated that plants from the vicinity of Tepelmeme Villa de Morelos, specifically the holotype and isotypes conserved as *Y. Mora et al. X976*, share the same morphology and differ substantially from those previously collected elsewhere. Here we propose these as a new variety.

Taxonomy

Ainea konzattii (R.C. Foster) Ravenna, Bot. Not. 132(4): 468. 1979. *Sphenostigma konzattii* R.C. Foster, Contr. Gray Herb. 165: 106. 1950. *Tigridia konzattii* (R.C. Foster) Goldblatt, Iris Fam. Nat. Hist. Class. 253. 2008.

Type:—MEXICO. Oaxaca: camino Montelobos, de Nopalera a Huitzo, 2000 m, 23 June 1907, *C. Konzatti 1904* (holotype: F 226051! / Bar Code 004595F)

Ainea konzattii var. *macropetala* Martorell, Espejo & López-Ferr., var. nov. (Figures 2B–D; 3)

Type:—MEXICO. Oaxaca: District of Coixtlahuaca, Municipality of Tepelmeme Villa de Morelos, paraje Loma Amarilla, 2075 m, 17°52'54"N, 97°20'40"W, pastizal de Aristida, 9 July 2022, Y. Mora et al. X976 (holotype UAMIZ!; isotypes: FCME!, MEXU!).

Nova varietas ab originali varietate differt in illis quae tepalis internis (petalis) similibus in forma et magnitudine tepalis externis (sepalis) vs. tepalis internis multo minora quam externis.



FIGURE 2. A. Flower, front view of *Ainea konzattii* var. *konzattii*; B. C. Flower, front view of *A. konzattii* var. *macropetala*; D. Flower dorsal view of *A. konzattii* var. *macropetala*. Photo credits: A. Guadalupe Munguía; B., C., D. Carlos Martorell.

Herbs 15–40 cm high. Bulbs ovoid to subglobose, 1–2.3 cm long, 9–18 mm diameter, covered by numerous dark brown cataphylls, sometimes extending upwards to form a 2–2.5 cm long collar at the base of the plant; basal leaves 2–5, green, linear, 10–20 cm long, 0.25–1 mm broad, acerose at the apex, old leaf bases remaining on plant, fibrous in appearance. Inflorescence one per plant; peduncle 13–22 cm long, ca. 1 mm diameter, cylindrical, glabrous, with a single linear-filiform bract at the base of spathes, 5–9 cm long; spathes sessile, 2–4.5 cm long, lanceolate, equal to subequal, convolute, the outer one longer than the inner one; rhipidium with 2–3 flowers, pedicels shorter than the spathes, filiform, glabrous. Flowers actinomorphic; perigonium 2.8–4 cm diameter; outer tepals white, elliptic to obovate, 1.4–2 cm long, 9–12.5 mm wide, rounded at the apex; inner tepals white with two basal lateral yellow spots

and small and scattered dark spots, elliptic, similar in size to outer tepals, rounded at the apex; filaments yellow, 3–4 mm long, base slightly broad, anthers yellow, oblong, 6–7 mm long, ca. 1 mm wide, dehiscent by a narrow lateral fissure, circinnate after anthesis, connective yellow-orange; ovary green, oblong to clavate, 2–3 mm long, ca. 1.2 mm diameter, style yellowish, long obconic, to 12.8 mm long, 1.6–1.7 mm diameter at the apex, stylar branches yellow 2.6–3 mm long, bifid, spreading, moderately thickened, secondary branches subulate with apical stigmatic areas. Capsule not seen.



FIGURE 3. Holotype of *Ainea konzattii* var. *macropetala*. Photo credits: Bruno Téllez-Baños.

Ecological data:—Populations of *Ainea konzattii* var. *macropetala* are located only ± 75 km (straight line) NNW from those of the typical type variety (Figure 1). The plants grow at elevations close to 2000 m a.s.l., on calcareous hills and bloom during the months of June and July. The climate in the region is semi-arid with an average temperature of 15.5°C, and an annual rainfall of 474.8 mm that is concentrated between May and October (Servicio Meteorológico Nacional 2023). Vegetation corresponds to natural grasslands dominated by the genus *Aristida* Linnaeus (1753: 82) (Cruz-Cisneros and Rzedowski 1980).

Conservation status:—The area where this variety grows is seriously threatened by the expansion of extensive pine afforestation under which the native grassland cannot develop. Assuming that this new variety is restricted to the calcareous temperate grasslands of northern Oaxaca, which cover about 50 km², and based on the rapid and extensive afforestation observed at the area (Martorell *et al.* 2022), this new variety must be considered as Endangered according to IUCN's criterion B2b (a shrinking area of occupancy < 500 km², IUCN Standards and Petitions Committee 2022).

Etymology:—The name of the proposed new variety alludes to the inner tepals, which are similar in size and also in shape to the outer tepals.

Specimens examined of *Ainea konzattii* var. *konzattii*:—MEXICO. Oaxaca: DISTRICT OF ETLA, Municipality of Santiago Tenango: a 1 km sobre la desviación a Santiago Tenango, carretera Oaxaca-Huajuapán, *A. García-Mendoza & E. Martínez* 4272 (MEXU), 1 km al N de la Carbonera, camino a Tenango, *A. García-Mendoza et al.* 7153 (MEXU, MO), 3 km al N de la Carbonera, camino a Tenango, *A. García-Mendoza et al.* 7157 (MEXU), 0.8 a 1.6 km de la brecha Carboneras-Santiago Tenango, *A. Rodríguez* 2948 (MEXU, UAMIZ); Municipality of San Juan del Estado, 10 km north of San Juan del Estado on the road towards San Miguel Aloapam, *E. Norman* 38 (ENCB). DISTRICT OF JUXTLAHUACA, Municipality of San Juan Mixtepec, Yúu tzáan (Cañada de las Cazuelas), 5 km al SW de San Juan Mixtepec, *A. García Mendoza and J. Reyes Santiago* 5046 (MEXU), barrio Loma a 1.5 km al W de San Juan Mixtepec, *J. Reyes Santiago* 444 (MEXU (×2)), Yucu Shúun (Monte del Tesoro), a 16 km al S de San Juan Mixtepec, *J. Reyes Santiago* 882 (MEXU), Tres Cruces, a 16 km al NE de San Juan Mixtepec, *J. Reyes Santiago* 1653 (MEXU(×2)), Yúu tzáan (Cañada de las Cazuelas), a 9 km al S de San Juan Mixtepec, *J. Reyes Santiago* 1935 (MEXU).

We include here an identification key to the two varieties of *Ainea konzattii*:

- Inner tepals distinct from the outer tepals in shape and size, 6.6–9 mm long, 3–3.3 mm wide, formed by an elliptic to rhomboid blade, shortly unguiculate at the base and long acuminate at the apex *A. konzattii* var. *konzattii*
- Inner tepals similar to the outer tepals in shape and size, 1.4–2 cm long, 9–12.5 mm wide, elliptic and rounded at the apex, not unguiculate at the base *A. konzattii* var. *macropetala*

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