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Nomenclatural note on *Juniperus thurifera* subsp. *africana* (Cupressaceae)

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Juniperus thurifera L. subsp. *africana* (Maire) Romo & Boratyński *stat. nov.* is proposed and justified. Morphological characters that separate that taxon from *J. thurifera* subsp. *thurifera* are provided.

Key words: Cupressaceae, *Juniperus thurifera*, nomenclature, phytogeography, taxonomy

Juniperus thurifera belongs to *Juniperus* subgenus *Sabina*, section *Excelsoides* (Barbero *et al.* 1994). The species is variable, occurring in several isolated localities in southwestern Europe and northwestern Africa (Farjon 2005, Romo & Boratyński 2005). The individuals from Africa were distinguished as var. *africana* (Maire 1926), but later considered to be a separate species, *J. africana* (Huguet de Villar 1947). Its specific status was regarded as doubtful by Greuter *et al.* (1984) and more recently the name was synonymized with *J. thurifera* (Farjon 2001, 2005).

Gauquelin *et al.* (1988) proposed an infraspecific epithet for the African plants, but failed to validly publish the new combination. The subspecific rank of the taxon was accepted by Lebreton (1990), Fennane and Ibn Tattou (1998), El Oualidi and Mathez (1999), and Adams *et al.* (2003), but not by Farjon (2001), who was of the opinion that it was insufficiently known due to the small number of herbarium specimens (Farjon 2005: p. 392).

A detailed study allowed us to distinguish two subspecies in *J. thurifera*, mostly on the basis of cone diameter and number of seeds per cone (Table 1). *Juniperus thurifera* subsp. *thurifera* occurs in Europe and includes three varieties, which differ from each other in their prodelphinidin content (Gauquelin *et al.* 1988, 1999). *Juniperus thurifera* subsp. *africana* grows on the mountains of northwestern Africa, mostly in Morocco and Algeria. An investigation of the essential oils and the RAPDs within *J. thurifera* subsp. *africana* also supported its clear differentiation (Adams *et al.* 2001, Akkad *et al.* 2001) from the European populations. An analysis of geographic variation in the leaf oils and RAPDs in *J. thurifera* from Europe and Morocco provides further support for distinguishing the African plants at the subspecific level (Adams *et al.* 2003).

In our biometrical study we found that all 90 individuals collected from three different Moroccan populations of *J. thurifera* had smaller cones

and fewer seeds per cone than the 116 individuals collected in four different European populations (Marcysiak *et al*. 2007). The differences presented in Table 1, supported by biochemical data (Gaquelin *et al*. 1988, 1999, Lebreton 1990, Akkad *et al*. 2001) and genetic data (Adams *et al*. 2001, 2003, Jiménez *et al*. 2003) justify sufficiently, in our opinion, the status of subspecies for the African plants.

Collecting data for distribution of *J. thurifera* in Morocco, we examined the specimens in the most important herbaria (Appendix) where the African material is stored. Also, during field investigations in the Middle and High Atlas in 2003–2005 we paid special attention to *J. thurifera* trees. All our data and field observations confirm the morphological differences between European and African specimens. However, *Juniperus thurifera* subsp. *africana* does not yet have a valid nomenclatural status according to the *International Code of Botanical Nomenclature* (Greuter *et al*. 2000). For this reason we validate the subspecific name here.

Juniperus thurifera L. subsp. ***africana*** (Maire) Romo & Boratyński, *stat. nov.*

Juniperus thurifera var. *africana* Maire, Bull. Soc. Hist. Nat. Afr. Nord 17: 125. 1926. — *J. africana* (Maire) Villar, Types de sol de l'Afrique du Nord, Fasc. 1: 91. 1947. — LECTOTYPE (designated here): Algérie. Aurès, forêts de cèdres du versant nord du Djebel Mahmel à Sgag, calcaire, 1600–1700 m, 14.VII.1892 *Trabut*, com. *Maire* (MPU 001676. Société Cénonane d'Exsiccata, n. 3071).

Gauquelin *et al*. (1988: p. 39) made a more detailed diagnosis of the taxon than Maire (1926) did, and created a subspecific rank for the variety described by him, but omitted the basionym and did not indicate the holotype of the material referred to in the amplified description. The previous combination (*Juniperus thurifera* L. subsp. *africana* (Maire) Gauquelin, Idr. Hass. & P. Lebreton, Ecol. Medit. 14(3–4): 39, 42 .1988) was thus not validly published (cf. Article 33.2 in Greuter *et al*. 2000).

Key to the subspecies

1. Leaf scale length 2.0–2.5 mm; cone diameter 7–12 mm, seeds (1)2–5(6) per cone ..... subsp. *thurifera*
1. Leaf scale length 1.0–1.5 mm; cone diameter 5–6(7) mm, seeds 1–2(3) per cone ..... subsp. *africana*

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Table 1. Differences between *Juniperus thurifera* subsp. *thurifera* and *J. thurifera* subsp. *africana* based on examined herbarium specimens and literature data (Gauquelin *et al.* 1988, Lebreton 1990).

Character	subsp. *thurifera*	subsp. *africana*
Cone diameter	7–12 mm	5–6(7) mm
Number of seeds per cone	(1)2–5(6)	1–2(3)
Leaf scale length	2.0–2.5 mm (do Amaral Franco 1986)	1.0–1.5 mm
Cone weight (Gauquelin *et al.* 1988)	(200)240–300 mg	130–200(212) mg
Presence of prodelphinidine in the leaves (Gauquelin *et al.* 1988, Lebreton 1990)	very low	high

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Appendix. Examined specimens of *Juniperus thurifera* subsp. *africana*.

HERBARIA: **Middle Atlas**: Aguelmane Sidi Ali ou Nohand, pentes rocailleuses, 2100 m, 1924 *Jahandiez* (G); Fôrets d'Aïn Kahla, 1900 m, 1924 *Jahandiez* (BC 138424; B); Bou Iblane (Moyen Atlas Oriental) Forets degradés, paturages d'haute Montagne, 2000 m, 1982 *Ayafi* (G); Jbel Hebri, Azrou; 14.5 km along track to Ain-Kahla from main Azrou-Midelt road, 1997 *Jury* (RDG); Jbel Hebri, Azrou; 3 km along track to Ain-Kahla from main Azrou-Midelt road at Jbel Hebri, 1997 *Jury* (RDG); north of Midelt, along minor road to Azrou, 1997 *Jury* (RDG); north of Midelt along minor road to Bekrite from main road to Azrou, 1997 *Jury* (RDG); Tamfroucht, 2000 m, 1927 *Maire* (MPU); N of Midelt, along road to Azrou, television transmitter above Col du Zad, 1997 *Jury* (RDG); Jbel Bou Iblane, 30S 0394014/3720086, 1885 m, 2005 *Boratyński, Didukh & Romo* (BC); Below Tizi-n-Ilisi, 29R 0764207/3521319, 2480 m, 2005 *Boratyński, Didukh & Romo* (BC). **High Atlas**: In Atlantis Majoris monte Anrhemer: supra Tizi-n-Fedghat, 2300 m, 1926 *Maire*, Iter Maroccanum Duodecimum (**ut handwrite** *Juniperus thurifera* var. *africana*) (MPU); Road from Imilchil to El-Ksiba, above Tassent, 1997 *Jury* (RDG); Acif Aït Mesan, Reraya, Arround, rive gauche de l'Acif Aït Mesan, 1950 m, 1923 *Litardière* (G); Aït Messane, in convalle fl. Aït Messane, in decliv. saxosis aridis supra pag. Arround, c. 2300 m, 1926 *Lindberg* (B); Amismiz, in Atlantis Majoris monte Erdouz supra oppidum Amismiz, in rupestr. calcareis, 2600 m, 1925 *Maire* (G) (ut *J. thurifera* var. *africana*); Ilmil, zwischen Asni und Ilmil, 2250–2550 m, felssen, wegrand, 1989 *Podlech* 47952 (G); Oukaïmeden, saddle of pass to track to television mast, 2000 *Jury* (RDG); W slopes of Jbel Oukaïmeden, along foot path to Tinoughâs, 2500 m, 1994 *Jury et al*. (B); Grand Atlas, sur la route d'Idni au Tizi n'Test, alt. 1700 m, 1952 *Retz* (G) (ut *J. thurifera* var. *africana*); Slopes of Tassaout valley, above Todgert, commonly, 29R 0699033/3477832, 2350 m, 2005 Boratyński, Didukh & Romo (BC). **Anti Atlas:** Sarhro: Jbel Amalhou Ou Mansour, Jbel Kouaoch, 2550–2700 m, 2003 *Dobignard* (2859, personal herbarium).

AUTHORS' FIELD OBSERVATIONS: **Middle Atlas**: Aguelmane Sidi Ali, ca. 25 very old individuals on grassy slope above the road to Azrou, 2100 m, 2002, 2005 *Romo & Boratyński*; ibidem, on the slopes above the lake, 2005 *Boratyński, Didukh & Romo*; about 10 km SE Azrou along the road toward Timhdite, single tree in the *Quercus ilex* wood on rocky (calcareous) terrain, 2000 m, 2002 *Romo & Boratyński*; on the hills SW of Mischliffen, single trees among the pastures on calcareous rocks, 2002 *Romo & Boratyński*; Col de Zad, 2200 m, 2004 *Romo*. **High Atlas**: Jbel Azourki, Tizi n'Tirgistalli, 2100 m, 2004 *Romo*; *ibidem*, Tizi n'Tsalli n'Imenaïn, 2600 m, 2004 *Romo*; single tree on the rocky ridge NE of Oukaimeden, 2400 m, 2002 *Romo & Boratyński*; Taddert: Tizi-n-Tichka, 2200m, 2002 *Romo & Boratyński*; Ait Anamis, to Asla, 29R 0700139/347778341, 2160 m, 2005 *Boratyński, Didukh & Romo*.