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Taxonomic revision of Sapindaceae in Tunisia, with new additions to national flora and the whole North Africa

Ridha El Mokni[1],[2] *; Duilio Iamonico[3]

Abstract. A taxonomic revision of the family Sapindaceae (order Sapindales) in Tunisia is presented. Field surveys were carried out during the last 10 years, allowing to identify 5 taxa of which 2 (*Acer monspessulanum* subsp. *monspessulanum* and *A. monspessulanum* subsp. *martinii*) are native, whereas the other 3 (*A. negundo*, *Dodonaea viscosa*, and *Sapindus saponaria*) are alien for the Tunisian flora. *A. monspessulanum* subsp. *martinii*, *A. negundo*, and *Dodonaea viscosa* are new records at national level, with *Dodonaea* representing a new genus for the Tunisian flora, whereas *Sapindus saponaria* is new for the whole North Africa. Information about nomenclature (accepted names, main synonyms, and types), morphology, chromosome number, chorology, occurrence in Tunisia, ecology (phenology and habitat), and taxonomic annotations are provided for each taxon, as well as original photos were prepared. Diagnostic keys at species and infraspecific ranks are also given.
Keywords: *Acer*, chorology, *Dodonaea*, new records, North Africa, *Sapindus*, typification.

[es] Revisión taxonómica de Sapindaceae en Túnez, con nuevas incorporaciones a la flora nacional y a todo el norte de África

Resumen. A continuación se presenta una revisión taxonómica de la familia Sapindaceae (orden Sapindales) en Túnez. Los estudios de campo realizados durante los últimos 10 años, permiten identificar 5 taxones de los cuales 2 (*Acer monspessulanum* subsp. *monspessulanum* y *A. monspessulanum* subsp. *martinii*) son nativos, mientras que los otros 3 (*A. negundo*, *Dodonaea viscosa* y *Sapindus saponaria*) son ajenas a la flora tunecina. *A. monspessulanum* subsp. *martinii*, *A. negundo* y *Dodonaea viscosa* son nuevas citas a nivel nacional, con *Dodonaea* representando un nuevo género para la flora tunecina, mientras que *Sapindus saponaria* es nuevo para todo el norte de África. Se proporciona información sobre nomenclatura (nombres aceptados, sinónimos principales y tipos), morfología, número de cromosomas, corología, citas en Túnez, ecología (fenología y hábitat) y anotaciones taxonómicas para cada taxón, así como también se prepararon fotos originales. También se dan claves de diagnóstico a nivel específico y subespecífico.
Palabras clave: *Acer*, corología, *Dodonaea*, nuevos registros, África del Norte, *Sapindus*, tipificación.

Introduction

Sapindaceae Juss. (Sapindales Juss. ex Bercht & J.Presl) is a family currently classified into four subfamilies, i.e. Dodonaeoideae Burnett, Hippocastanoideae Burnett, Sapindoideae Burnett, and Xanthoceroideae Thorne & Reveal (Buerky et al. 2010; Cole & Ferucci 2020). As a whole, 142 genera and 1860 species are currently accepted according to Christenhusz & Byng (2016), and they have a predominantly pantropical distribution, whereas some taxa occur in temperate regions (Buerky et al. 2009).

The Flora of Tunisia currently comprises just one species belonging to the family Sapindaceae, i.e. *Acer monspessulanum* L., whereas *Acer campestre* L. is doubtfully recorded for the country (Le Floc'h et al. 2010: 69; Dobignard & Chatelain 2011: 7–9).

As part of the ongoing floristic researches on the flora of Tunisia, we found populations of four new Sapindaceae taxa, and we here present a taxonomic revision of the whole family at national level. Among the new floristic records, two are represented by a native species [*Acer monspessulanum* subsp. *monspessulanum* and *A. monspessulanum* subsp. *martinii* (Jord.) P. Fourn.], whereas the other three taxa are aliens [*A. negundo* L., *Dodonaea viscosa* (L.) Jacq., and *Sapindus saponaria* L.]. While *A. monspessulanum* subsp. *martinii*, *A. negundo*, and *Dodonaea viscosa* are new at national level (*Dodonaea* represents a new genus for the Tunisian flora), *Sapindus saponaria* is new for the whole North

[1] University of Monastir, Laboratory of Botany, Cryptogamy and Plant Biology, Faculty of Pharmacy of Monastir, Avenue Avicenna, 5000-Monastir, Tunisia.
[2] University of Carthage, IRESA, Laboratory of Forest Ecology, National Research Institute of Rural Engineering, Water and Forests (INRGREF), 2080-Ariana, Tunisia.
E-mail: ridhaelmokni@yahoo.fr * corresponding author.
ORCID: https://orcid.org/0000-0003-3849-1039
[3] University of Rome Sapienza, Department of Environmental Biology, Piazzale Aldo Moro 5, 00185, Rome.
E-mail: duilio.iamonico@uniroma1.it
ORCID: https://orcid.org/0000-0001-5491-7568

Africa (Raab-Straube 2018+; APD 2023; POWO 2023).

Material and methods

The work is based on field surveys carried out by the first author (REM) in Tunisia over the last 10 years. Collected specimens are deposited at the personal collection of one of the authors (R. El Mokni) deposited in the herbarium of the Faculty of Sciences of Bizerta (not listed in *Index Herbariorum*) and, since 2015, in the Herbarium of Monastir University (not listed in *Index Herbariorum*), as well as in RO (herbarium codes follow Thiers (2023) [continuously updated]). Analysis of relevant literature and examination of specimens preserved in the herbaria MPU and P was also carried out.

Taxonomic treatment

1. *Acer* L., Sp. Pl. 1054 (1753).

Lectotype (designated by Britton & Brown 1913: 494): *Acer pseudoplatanus* L.

Acer L. is a genus of shrubs and medium sized trees comprising about 152 species occurring in broad-leaved deciduous forests of Northern Hemisphere (Xu et al. 2008; Acevedo-Rodríguez et al. 2011; Li et al. 2019). The members of this genus (commonly known as "maples") are usually recognised by their characteristic palmately-lobed leaves and double samaras. Samaras are laterally compressed, simple, dry, indehiscent, winged, so they are dispersed by wind. In *Acer*, two samaras, each with a single seed, are connected on the seed containing ends to form a double samara.

In Tunisia, is currently recorded only *Acer monspessulanum* (Le Floc'h et al. 2010: 69), whereas *A. campestre* is doubtfully indicated. The field surveys allow to verify the occurrence of two taxa which are new for the national flora, i.e. *A. monspessulanum* subsp. *martinii* [note that Le Floc'h et al. (2010: 69) did not specify which subspecies of *A. monspessulanum* occurs in Tunisia, but they likely refer to the subsp. *monspessulanum*] and *A. negundo*. A diagnostic key to *Acer* taxa in Tunisia follows:

1. Leaves pinnately 3–5(–7)-foliolate...***A. negundo***
1'. Leaves entire mainly with three-lobed.....***A. monspessulanum***
> Leaves thin, green, with three entire lobes; fruits large (28–37 mm), wings few constricted at the base and slightly divergent towards the top…. subsp. *monspessulanum*
> Leaves coriaceous, glaucous and ashy below, with three toothed lobes and often two small supernumerary lateral lobes; fruits small (22–30 mm), samaras sides anastomosing, wings base slightly narrowed putting the converging ….. subsp. *martinii*

1.1. *Acer monspessulanum* L., Sp. Pl. 2: 1056 (1753)

Lectotype (designated by Murray 1975: 13): *Habitat Monspelii & Creta*, Herb. LINN-1225.15 (LINN image of the lectotype available at http://linnean-online.org/12350/).

Description. Small tree up to 15 m in height (mostly between 5 to 10 m), deciduous, usually rather bushy, with a diffuse and clear crown; bark yellowish-gray in color, quickly becoming cracked as the stem ages; **leaves** opposite, with three lobes; lobes separated, almost at right angles; **blade** glabrous with a entire margin, leathery, with a shiny upper surface and dull; tufts of hair at the base of the vein branches on the underside; **buds** with brown scales, dry, and glabrescent; **flowers** in small upright clusters then tilted; **fruit** as a disamara with almost parallel wings.

Chorology. Species native to the Mediterranean area, from Portugal to Middle East and North Africa (Morocco, Algeria, and Tunisia), also occurring through the Jura Mountains in France and the Eifel in Germany (Raab-Straube 2018+; APD 2023).

Distribution in North Africa and preferential habitat. *Acer monspessulanum* s.lat. inhabits calcareous (mainly limestone) soils and often on stony and rocky soils in forests of the middle mountains of Morocco mainly in the mountains of Debdou and Djebel Tendri (Fennane et al. 2007: 249) in Algerian mountains that are higher than 800 m a.s.l. (Quézel & Santa 1963: 615) and (only subsp. *monspessulanum*) on calcareous rocky mountains of the Tunisian Dorsale, where it is considered to be a rare species confined to the heads of Djebel Zaghouan, Djebel Bargou and Djebel Serdj (Pottier-Alapétite 1979: 489-490).

Taxonomic notes. *Acer monspessulanum* can be easily distinguished by its small leaves (3–6 cm long, 3–7 cm wide), 3-lobed, glossy dark green, sometimes a bit leathery, and with entire margin and petiole 2–5 cm long (see e.g. Pottier-Alapétite 1979: 489-490; Quézel & Santa 1963: 615; Tison & De Foucault 2014: 1041; Tison et al. 2014: 952; Pignatti 2018: 1102). It is a highly variable species, including 9 subspecies according to Raab-Straube (2018+), of which only the autonymic taxon is currently recorded in Tunisia and, among the other subspecies, only one (*Acer monspessulanum* subsp. *martinii*) occurs in North Africa (Morocco and Algeria).

Figure 1. *Acer monspessulanum* subsp. *monspessulanum* in northwestern Tunisia. A: habit of the main population in Siliana mountains. B: leafy branches with typical thin, green, entire 3-lobed leaves in fruiting period. C: typical disamara with wings less constricted at the base slightly divergent towards the top. Photographs by R. El Mokni in Siliana region (NW of Tunisia), 07 and 29 May 2015.

1.1a. *Acer monspessulanum* L., Sp. Pl. 2: 1056 (1753) subsp. *monspessulanum* (Fig. 1).

Phenology. Flowering time March to April; fruiting time May to June.

Chromosome number. 2n = 2x = 26 (Santamour 1988; Siljak-Yakovlev et al. 2010).

Distribution and habitat in Tunisia (Fig. 2)**.** On calcareous rocky-mountains of the Tunisian Dorsale, where it is confined to the heads of Djebel Serdj, Djebel Bargou and their surroundings of Siliana region (Northwestern of Tunisia) and the summits of Djebel Zaghouan in Zaghouan region (Northeastern of Tunisia) (Pottier-Alapétite 1979: 489-490).

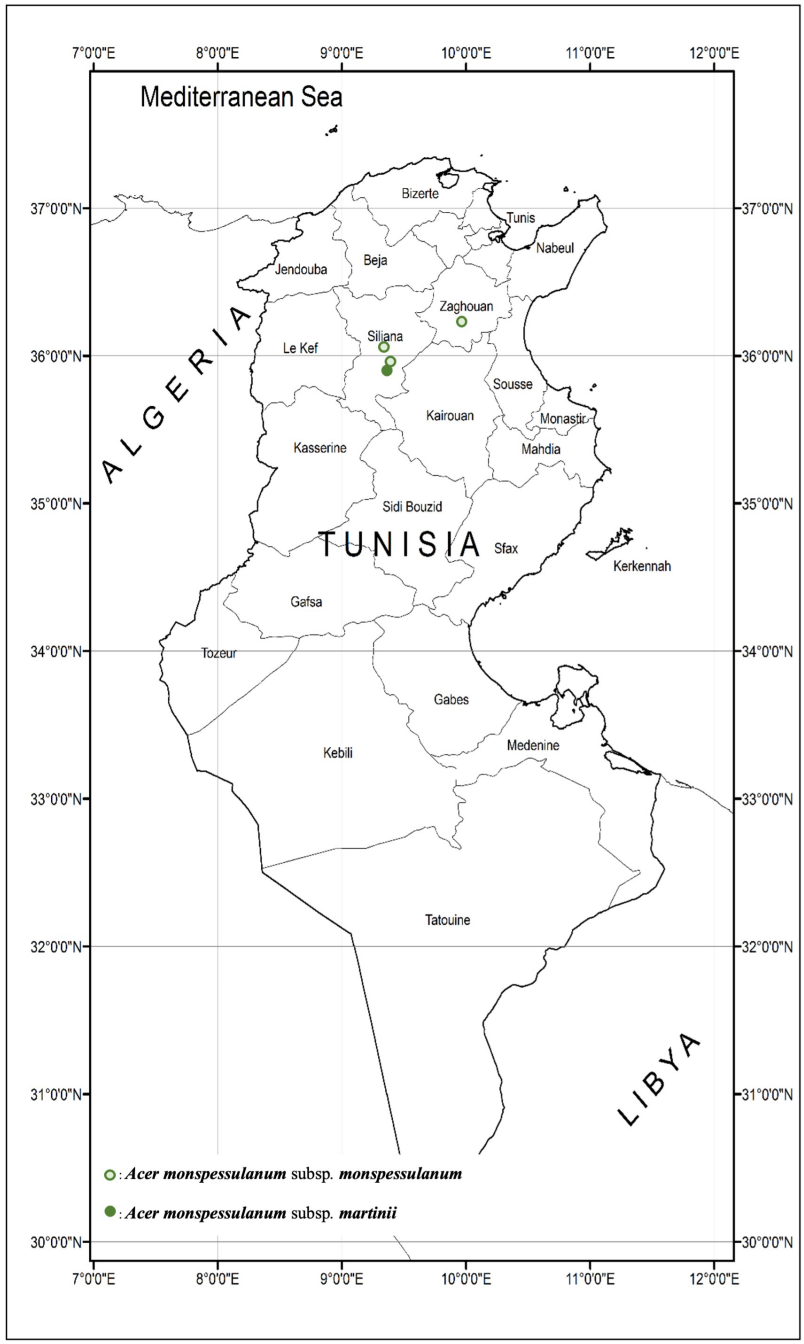

Figure 2. Different localities of both subspecies of *Acer monspessulanum* in Tunisia.

Selected examined specimens. **TUNISIA**. Siliana: mixed forest of aleppo pine and holm oak on calcareous rock outcrops of Djebel Serdj, 29 May 2015, *El Mokni s.n.* (Herb. El Mokni!).

1.1b. *Acer monspessulanum* subsp. *martinii* (Jord.) P. Fourn., Quatre Fl. France (ed. 1): 640 (1937) ≡ *Acer martinii* **Jord., Mém. Acad. Roy. Sci. Lyon, Sect. Sci. ser. 2, 1: 263 (1851).**

Type: not designated.

Diagnosis. Similar to subsp. *monspessulanum* but leaves with 3-toothed lobes and two small supernumerary lateral lobes (Quézel & Santa 1963: 615) (Fig. 3).

Figure 3. *Acer monspessulanum* subsp. *martinii* in northwestern Tunisia. A: plant habit in its habitat. B: details of typical leaves, adaxial face. C: germination of one-seeded samara. Photographs by R. El Mokni in Siliana region (NW of Tunisia), 29 May 2015.

Phenology. Flowering time March to April; fruiting time May to June.

Chromosome number. 2n = 2x = 26 (Santamour 1988!).

Distribution and habitat in Tunisia (Fig. 3)**.** First record for Tunisia. Mountains of Siliana region and its surroundings, in Sidi Hmada and Djebel Serdj (Northwestern of Tunisia).

Notes on the associated species in Tunisian localities. *Acer monspessulanum* subsp. *martinii* grows together with[4] *Acinos alpinus* (L.) Moench subsp. *meridionalis* (Nyman) P.W.Ball., ᵋ*Arabis tunetana* Murb., *Ampelodesmos mauritanicus* (Poir.) T.Durand & Schinz, *Aphanes floribunda* (Murb.) Rothm., *Asperula hirsuta* Desf., *Bellevalia mauritanica* Pomel, *Bivonaea lutea* (Biv.) DC., ʷ*Bupleurum balansae* Boiss. & Reut., **Campanula rapunculus* L. var. *spiciformis* Boiss., *Dactylis glomerata* L., *ᵋ*Erysimum teppneri* Polatschek, *ʷ*Hedera algeriensis* Hibberd, *ᵋ*Helianthemum virgatum* (Desf.) Pers. subsp. *africanum* (Murb.) Dobignard, **Kundmannia sicula* (L.) DC., **Lamium garganicum* L., *Lonicera implexa* Aiton, **Magydaris pastinacea* (Lam.) Paol. & Bég., **Medicago lupulina* L., *ʷ*Pimpinella lutea* Desf., *P. tragium* Vill., *Polygala rupestris* Pourr. subsp. *rupestris*, *Sedum acre* L. subsp. *neglectum* (Ten.) Arcang., **S. album* L., *ʷ*S. dasyphyllum* L. subsp. *glanduliferum* (Guss.) Nyman, ᵋ*Sideritis incana* subsp. *tunetana* Murb., **Rhamnus myrtifolia* Willk., *Ruscus aculeatus* L., *ʷ*Silene atlantica* Coss. & Durieu, *S. italica* (L.) Pers., *Tanacetum corymbosum* (L.) Sch. Bip. subsp. *corymbosum*, *ʷ*Teucrium polium* L. subsp. *aurasiacum* (Maire) Greuter & Burdet, *ʷ*Thymus algeriensis* Boiss. & Reut., *Tulipa sylvestris* L. subsp. *australis* (Link) Pamp., ʷ*Viola munbyana* Boiss. & Reut., **Xiphion junceum* (Poir.) Parl.

The occurrence of this taxon in limestone Tunisian mountains of the Dorsale, despite being new for the national flora, is not surprising. We think that it

[4] Taxa newly reported for the site are marked with an asterisk (*), endemics strict to Tunisia are marked with the symbol "ε", subendemics are marked with the symbol "ω".

was probably misidentified in the past or even not recognised as a different taxon (see e.g. Mechergui et al. 2018). Naturally occurring, even relatively rare, in such ombrophilous undisturbed habitats (mainly at altitudes above 800 m a.s.l.) could be appropriate for a wider population. Additionally, thick, humus-rich soil layers were observed within the niche of the population found by us. Thus, they could promote germination seeds and may account for the conservation of the species as for the accompanying endemics that were recorded.

Low competition from plants (mostly therophytes, hemicryptophytes, and chamaephytes), coupling with the abundance of mosses, moss-like lichens (*Cladonia* spp.) and lichens (mainly crustose) in such fresh natural habitats, and with the absence of high grazing pressure and agricultural activities in the surroundings or other modes of land use can only advocate in favor of high natural regeneration and conservation of the subspecies.

Conservation status. It is reported of two Tunisian localities (distance between them of 700–800 m) and 20–24 individuals in total were observed. By the application of the criterion D of IUCN (2021) (number of mature individuals ≤ 50), the taxon is assessed as Critically Endangered (CR).

Note on the type of Acer martinii. Jordan (1851: 263) validly published the name *Acer martinii* by a description, the provenance and collector ("Hab. in dumosis et montosis apricis circa *Lyon* (C. Martin)"). This latter citation represents a syntype according to the Art. 9.6 of ICN. No specimen which can be considered as part of the original material was found by us in the Herbaria BM, K, LY, and P (see HUH Index of botanists 2013) where we traced respectively 31 sheets. In fact, none of these sheets were collected before the year 1851 and none by "C. Martin". According to the ICN, a neotypificaiton would be required (Art. 9.8). However, since the taxonomic criticism of this taxon, we would prefer to avoid to designate a neotype for the moment and try to continue to search further material useful for the lectotypification purpose.

Selected examined specimens. **TUNISIA. Siliana:** Sidi Hmada, 35°56'37"N, 009°33'29"E, north slope of the natural calcareous rock outcrops of Djebel Serdj, about 1106 m a.s.l., 29 May 2015, *El Mokni s.n.* (Herb. El Mokni!).

1.2. *Acer negundo* L., Sp. Pl. 2: 1056 (1753).

Lectotype (designated by Murray 1975: 6): *Habitat in Virginia*, Herb. LINN-1225.17 (LINN! image of the lectotype available at http://linnean-online.org/12352/).

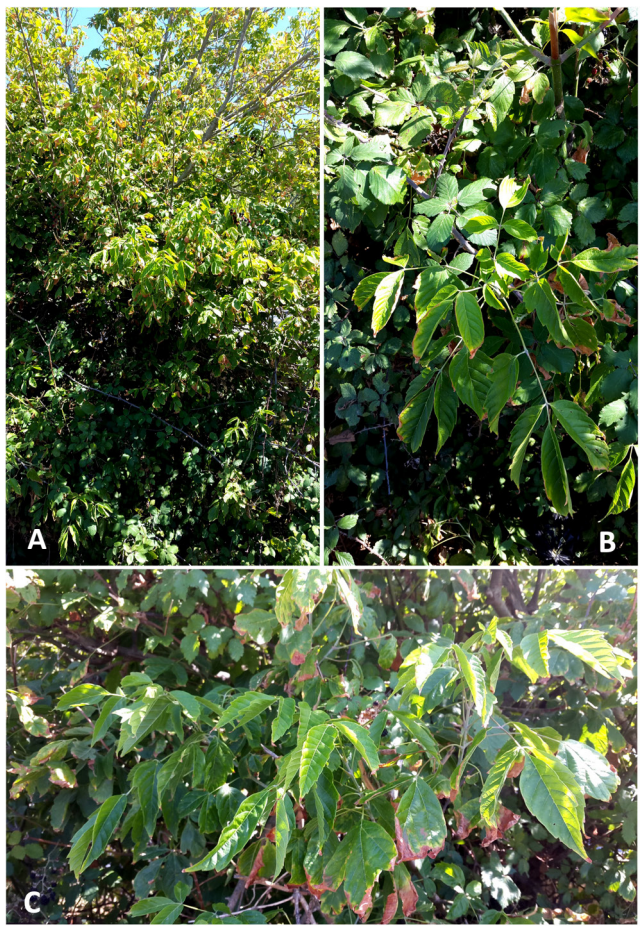

Figure 4. *Acer negundo* in northwestern Tunisia. A: plant habit in its habitat. leaves of juvenile plant growing in a tuft of bramble. C: details of typical pinnate leaves, adaxial face. Photographs by R. El Mokni in Ain Draham region (NW of Tunisia), 29 May 2015.

Description (Fig. 4)**.** Dioecious tree up to 20 m in hight; bark yellowish to gray brown; **branchlets** glabrous, those of present year green, older ones yellowish brown; **leaves** deciduous; leaf blade 10–25 cm, papery, pinnate; petiole 5–7 cm, pubescent then glabrescent; **leaflets** 3–7 per petiole; leaflet blades ovate or elliptic-lanceolate, 8–10 × 2–4 cm, base rounded or truncate, margins with 3–5 teeth, apex acute rarely entire; pistillate **inflorescence** pendulous, racemose or compound racemose, axillary from leafless buds, 15–50-flowered; staminate inflorescence usually a cluster of 4 flowers; **flowers** 4-merous; **samaras** brownish yellow; nutlets convex, glabrous; wing including nutlet 3.0–3.5 cm × 8–10 mm, wings spreading acutely or nearly erectly.

Phenology. Flowering time March to May; fruiting time August to October.

Chromosome number. 2n = 2x = 26 (Foster 1933).

Chorology. *Acer negundo* is a species native to North America (from southern Canada to the mountains of Mexico), Guatemala, and along the Atlantic coast where it grows in deciduous forests and in scrub- and grass-dominated vegetation types (Rosario 1988; Binggeli 2005). It has been widely planted as an ornamental tree species throughout central and southern Europe where widespread following centuries of horticultural and landscape planting (see e.g. Binggeli 2005; Campagnaro et al. 2018). The species is also recorded as invasive alien in natural vegetation types in the U.S.A. and Canada (Rosario 1988; Havinga 2000). In Europe, it occurs both in urban areas and human-made habitat and in natural vegetation communities, e.g. along river banks or on the edge of forests, from sea level to medium-high altitudes (Sachse 1991; Campagnaro et al. 2018). In some cases, this species invades also rare and protected ecosystems, as the virgin forest of Bialowieza in Poland (Adamowski et al. 2002). Finally, *A. negundo* is able to colonize wide areas forming almost monospecific forests (see e.g. Walter et al. 2005; Tabacchi & Planty-Tabacchi 2003; Saccone et al. 2010). In North Africa, the species is reported to be cultivated but only in Morocco and Algeria (Raab-Straube 2018+; APD 2023).

Distribution, habitat and alien status in Tunisia. First record for Tunisia. *Acer negundo* grows on the edges of Kroumirian oak forest within an extended patch of brambles in Jendouba (Aïn Draham). At the current state of knowledge, we consider the species as a casual alien in Tunisia.

Notes on the associated species in Tunisian locality. The species grows together mainly with *Ampelodesmos mauritanicus*, *Arbutus unedo* L., *Daucus virgatus* (Poir.) Maire, *Clematis flammula* L., *Clinopodium menthifolium* (Host) Stace subsp. *ascendens* (Jord.) Govaerts, *Cytisus villosus* Pourr., *Epilobium tetragonum* L. subsp. *tournefortii* (Michalet) Lév., ω*Galactites mutabilis* Durieu, ω*Galium tunetanum* Lam., *Helosciadium nodiflorum* (L.) W.D.J.Koch, *Juncus effusus* L., **Medicago lupulina* L., ω*Plagius maghrebinus* Vogt & Greuter, *Prunella vulgaris* L., *Pteridium aquilinum* (L.) Kuhn, ω*Quercus canariensis* Willd., *Q. suber* L., *Rosa sempervirens* L., *Rubus ulmifolius* Schott, *Viburnum tinus* L., *Viola alba* L. subsp. *dehnhardtii* (Ten.) W.Becker.

Taxonomic notes. The phenotypic variability of *Acer negundo* was described by Rosario (1988) who recognized the following six varieties: var. *arizonicum* Sarg., var. *californicum* Sarg., var. *interior* (Britt.) Sarg., var. *negundo*, var. *texanum* Pax., and var. *violaceum* (Kirchn.) Jaeg. These taxa would be distinguished on the basis of pubescence or colour of the branches and/or samaras and, sometimes, by the leaf shape (see Anonymous 1963; Rosario 1988). Samples from Tunisia are identifiable as var. *negundo* (branchlets green, not glaucous).

Selected examined specimens. **TUNISIA. Jendouba:** Aïn Draham, 36°47’42”N, 008°40’53”E, on the margin of oak forest within an extended bramble patch, about 620 m a.s.l., 17 August 2019, *El Mokni s.n.* (Herb. El Mokni!).

2. Dodonaea Mill., Gard. Dict. Abr., ed. 4. 1754.

Lectotype (designated by Leenhouts 1983: 28): *Dodonaea viscosa* Jacq.

Dodonaea Mill. is a genus of 72 species, native to Tropics and Subtropics (POWO 2023) and comprising small evergreen trees and shrubs, with simple or compound leaves, flowers uni- or bisexual with 3–7 free sepals, petaless, 5–10 stamens (anthers much longer than the filaments) inserted in the outer surface of a circular disk, ovary 2–6-locular, each one including 2 ovules, fruit as a papery dehiscent capsule, each with 1–2 black and globose to lenticular seeds.

2.1. *Dodonaea viscosa* Jacq., Enum. Syst. Pl. 19. 1760 ≡ *Ptelea viscosa* Linnaeus, Sp. Pl. 1: 118. 1753.

Lectotype (designated by West 1984: 34): [icon] t. 162 f. 3 in Sloane (1725); image of the lectotype available at https://data.nhm.ac.uk/dataset/sloane-herbarium/resource/612007dd-ce3f-4077-b745-793b9f4d780d/record/1406.

Description (Fig. 5)**.** Shrubs or small trees, 1–3 m tall or higher; **branches** flat, narrowly winged or ridged, with sticky juice; **leaves** simple, petiole short or leaves subsessile, blades variable in shape and size, linear, linear-spoon-shaped, linear-lanceolate or oblong, 5–12 × 0.5–4.0 cm, papery, both surfaces with sticky juice, glabrous, glossy when dry, lateral veins many, dense, very slender, margin entire or inconspicuously shallowly wavy, apex acute, obtuse, or rounded; **inflorescences** terminal or axillary near apices, shorter than leaves, densely flowered, rachis and branches ridged; **pedicels** 2–5 mm, sometimes to 10 mm, slender; **sepals** 4, lanceolate or narrowly

elliptic, ca. 3 mm long, apex obtuse; **stamens** 7–8; filaments less than 1 mm long; anthers incurved, ca. 2.5 mm long, glandular; **ovary** ellipsoid, abaxially with sticky juice, 2- or 3- locular; style ca. 6 mm long, apex 2- or 3-lobed; **capsules** obcordiform or compressed-globose, 2- or 3-winged, 1.5–2.2 cm tall, with wing 1.8–2.5 cm wide; testa membranous or papery, veined; **seeds** 1–2 per locule, black, lens-like (cf. WFO 2023a).

Figure 5. *Dodonaea viscosa* in northeastern Tunisia. A-B: plant habit in two different habitats. C: beginning of blooming. D: inflorescence and flowers. E: globose 3-winged fresh fruits. F: dried dehiscent capsules. Photographs by R. El Mokni in Zaghouan region (NE of Tunisia), 10 April 2016 to 05 December 2020.

Phenology. Flowering time December to March; fruiting time April to June.

Chromosome number. 2n = 2x = 28 (West 1984; Gill et al. 1990; Oginuma et al. 1997).

Chorology. *Dodonaea viscosa* naturally occurs throughout the tropics and subtropics regions of the world (see e.g. Davies & Verdcourt 1998; Exell 1966; Ghisalberti 1998; Palmer & Pitman 1972–1974; Turnbull 1986; van Welzen 2001). It is widespread in Australia, South Africa, North America, China, India, Ceylon, and Pakistan (Abdulla 1973; Harrington & Gadek 2009) where it grows mainly in forest edges, coastal areas, and sandy beaches. The species can be also commonly found as a strandline shrub

growing near mangroves vegetation, in temperate woodlands, and in desert gullies or arid shrub lands (see e.g. Harrington & Gadek 2009). It can be also found at high elevations (up to 4000 m a.s.l.) in the Himalayan foothills, the interandean valleys of Perù and the mountains of Oman and Yemen (Ghazanfar & Fisher 1998). *D. viscosa* is recorded as alien in Europe (Cyprus and Spain) and Asia (Saudi Arabia and from Iran to China) (see Raab-Straube 2018+; POWO 2023). In North Africa, *D. viscosa* is reported as native in Algeria, Libya, and Egypt (Raab-Straube 2018+; APD 2023).

Distribution, habitat and alien status in Tunisia. First record for Tunisia. *Dodonaea viscosa* was found in forest pine edges within the Zaghouan mountains (NE-Tunisia). The first observation was five year ago and during that time the number of individual increased and young plants were observed. We here consider this species as a naturalized alien.

Notes on the associated species in Tunisian locality. The species grows together mainly with *Ajuga iva* (L.) Schreb., *Achyrophorus valdesii* F.J.Jiménez *et al.*, *Allosorus guanchicus* (Bolle) Christenh., *Ampelodesmos mauritanicus*, *Asparagus albus* L., *Asplenium ceterach* L. subsp. *ceterach*, *Calicotome villosa* (Poir.) Link, *Catananche lutea* L., *Ceratonia siliqua* L., *Convolvulus lineatus* L., *Crataegus azarolus* L., *C. monogyna* Jacq., *Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman, *Eryngium dichotomum* Desf., *Ferulago lutea* (Poir.) Grande, *Globularia alypum* L., *Linum decumbens* Desf., *Lysimachia monelli* (L.) U.Manns & Anderb. subsp. *monelli*, *Micromeria nervosa* (Desf.) Benth., *Pistacia lentiscus* L., *Pinus halepensis* Mill., *Plantago albicans* L. subsp. *albicans*, *Prasium majus* L., *Rhamnus lycioides* L., *Rosmarinus officinalis* L., *Salvia viridis* L., *Scorpiurus muricatus* L., *Sideritis romana* L., *Stipa capensis* Thunb., *Tetraclinis articulata* (Vahl) Mast., *Teucrium polium* L. subsp. *aurasiacum* (Maire) Greuter & Burdet, *Tordylium apulum* L., *Tripodion tetraphyllum* (L.) Fourr., etc.

Taxonomic notes. Harrington & Gadek (2009) recognized for Australia 7 subspecies for *Dodonaea viscosa* which were distinguished mainly on the basis of habit, leaves, and capsule shape, as well as the number of wings per capsule. In tropical Africa, Turnbull (1986) recorded 2 varieties i.e. var. *viscosa* [from coastal areas of West Africa (from Senegal to Nigeria) and East Africa (from Kenya to Mozambique), and in Madagascar], which has usually bisexual and whitish flowers, a strongly 2-lobed scar of fallen sepals beneath the fruit and not or only slightly compressed seeds, and var. *angustifolia* (L.f.) Benth. (from inland territories, in Democratic Republic of Congo in the west to Ethiopia and Somalia in the east, and South Africa in the south, and also in Madagascar), which has usually shorter and narrower leaves, usually unisexual and greenish-yellow flowers, a more or less annular scar of fallen sepals beneath the fruit and more compressed seeds. Material collected from Tunisia belongs to the var. *viscosa*.

Selected examined specimens. **TUNISIA. Zaghouan:** Zaghouan mountains, 36°23’14”N, 010°07’31”E, in the margin of forest pine, about 295 m a.s.l., 10 April 2016, *El Mokni s.n.* (Herb. El Mokni!), *ibidem*, 22 April 2017, *El Mokni s.n.* (Herb. El Mokni!), ibidem, 12 December 2020, *El Mokni s.n.* (Herb. El Mokni!),

3. Sapindus Tourn. ex L. Sp. Pl. 1: 367. 1753.

Lectotype (designated by Britton & Brown 1913: 500): *Sapindus saponaria* L.

Sapindus Tourn. ex L. is a genus comprising 13 species, naturally occurring in Tropical and Temperate Asia, Chad, and Pacific, Southern, and Northern America (POWO 2022). It includes trees with pinnate leaves (2–8 pairs of leaflets), flowers regular, arranged in panicles, each flower with 5 sepals (2 short) and 5 petals, 8 stamens and ovary 3-lobed; fruit as a drupe.

3.1. *Sapindus saponaria* L., Sp. Pl. 1: 367. 1753.

Lectotype (designated by Pennington 1993: 84): [icon] *Nuciprunifera arbor americana, fructu saponario orbiculato monococco nigro*, t. 217 f. 7 (Plukenet 1692). Typotype: *Herb. Sloane* 97: 127; 101: 122 (BM-SL).

Description (Fig. 6)**.** Trees, deciduous, up to 20 m in hight; **bark** grayish or blackish brown; young **branches** green, glabrous; **leaves** with petiole 25–45 cm (sometimes longer), rachis slightly flat, grooved adaxially, glabrous or pilosulose; **leaflets** 5–8 pairs, usually subopposite, petiolule ca. 5 mm long, blades adaxially shiny, narrowly elliptic lanceolate or slightly falcate, 7–15 × 2–5 cm, thinly papery, abaxially glabrous or pilosulose, lateral veins 15–17 pairs, nearly parallel, dense, slender, base cuneate, slightly asymmetrical, apex acute or shortly acuminate; **inflorescences** terminal, conical; **flowers** actinomorphic, small; **pedicels** very short; **sepals** ovate or oblong-ovate, larger ones ca. 2 mm, abaxially pilose at base; **petals** 5, lanceolate, ca. 2.5 mm long, abaxially villous at base or subglabrous, long clawed; **scales** 2, earlike, at base adaxially; **disk** acetabuliform, glabrous; **stamens** 8, exserted; **filaments** ca. 3.5 mm long, densely villous below middle; **ovary** glabrous; fertile **schizocarps** orange, black when dry, subglobose, 2.0–2.5 cm in diameter (cf. WFO 2023b).

Phenology. Flowering time from June to August; fruiting time September to December.

Chromosome number. 2n = 2x = 28 (Neffa & Ferrucci 1998).

Chorology. *Sapindus saponaria* is indigenous to South America west in Argentina, Paraguay, Brazil, Bolivia, Peru, Colombia, Venezuela, and Surinam, and in the Caribbean to Florida and Central America to Mexico, across the Pacific Basin on a number of islands to New Caledonia, also in Africa (Wagner et

al. 1999: 1229). The plant is introduced in many countries of Africa (Angola, Cameroon, Cape Verde, Guinea-Bissau, Gulf of Guinea Island, Mali, New Guinea, Tanzania, Uganda, Zaïre) and Asia (Venezuelan Antilles, Vietnam, Bangladesh, India, Myanmar, Philippines), as well as in the Galápagos archipelago (POWO 2023). On the contrary, it is rare in Europe, where is recorded only from Cyprus but as a cultivated plant (Raab-Straube 2018+; POWO 2023).

Figure 6. *Sapindus saponaria* in northeastern Tunisia. A: Juvenile plants from seeds. B: plant habit during fruiting period. C: inflorescence and flowers. C: mature fruits. Photographs by R. El Mokni in Bizerta region (NE of Tunisia), 21 December 2015 to 14 September 2020.

Distribution, habitat, and alien status in Tunisia. In North Africa, no record for the species appears to be yet published. Thus, *Sapindus saponaria* (and the genus *Sapindus* as a whole) is here reported for the first time in Tunisia and the whole North Africa. We here consider this species as a casual alien growing along roadsides of Bizerta region.

Notes on the associated species in Tunisian locality. Seedlings of the species grow together mainly with few sporadic plants, e.g. *Amaranthus deflexus* L., *Campanula erinus* L., *Cymbalaria muralis* P.Gaertn., B.Mey. & Scherb., *Lepidium coronopus* (L.) Al-Shehbaz, *Mercurialis annua* L. subsp. *annua*, *Parietaria judaica* L., *Polycarpon*

tetraphyllum (L.) L., *Rostraria cristata* (L.) Tzvelev, *Sisymbrium irio* L.

Taxonomic notes. *Sapindus saponaria* differs from the related species mainly by its actinomorphic flowers and the presence of 5 petals [*vs*. 4 petals in *S. delavayi* (Franch.) Radlk., *S. rarak* DC., and *S. tomentosus* Kurz]. Petals are basally long clawed, with 2 ear-like scales adaxially in *S. saponaria* whereas for the other three abovementioned species they are not clawed, and show only 1 large scale at their base adaxially (see Nianhe & Gadek 2007).

Selected examined specimens. **TUNISIA**. **Bizerta:** Bizerta-city, 37°16'19"N, 009°52'32"E, within roadsides, about 05 m a.s.l., 21 December 2015, *El Mokni s.n.* (Herb. El Mokni!), ibidem, 21 June 2018, *El Mokni s.n.* (Herb. El Mokni!), *ibidem*, 14 September 2020, *El Mokni s.n.* (Herb. El Mokni!), ibidem, 03 July 2021, *El Mokni s.n.* (Herb. El Mokni!).

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