

NOMENCLATURE

Typification and nomenclature of the names in the *Santolina chamaecyparissus* species complex (Asteraceae)

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Abstract A nomenclatural revision of the *Santolina chamaecyparissus* species complex is presented. A detailed survey of original material for all names applied to members of the complex was performed, and 28 names are newly typified. The current usage of the names *S. villosa* and *S. ericoides*, relating to some Spanish and French populations, is discussed. The name *S. villosa* is applied to a taxon endemic to Spain, whereas *S. ericoides* is applied to those Spanish and French populations often traditionally referred to *S. villosa*.

Keywords Anthemideae; Linnaeus; Mediterranean Basin; Miller; taxonomy

■ INTRODUCTION

Linnaeus (1753) described seven species under *Santolina* L., but only *S. chamaecyparissus* L. and *S. rosmarinifolia* L. are still included in the genus, whereas the other five are now placed in *Athanasia* L. and *Lonas* Adans. (The Plant List, 2020). According to the *Med-Checklist* (Greuter, 2008), *Santolina* includes 24 species, distributed in the western portion of the Mediterranean Basin. Greuter (2008), as was the case with many previous authors (Jordan & Fourreau, 1869; Lacaita, 1925; Marchi & D'Amato, 1973; Marcos & Burgaz, 1990; López-Udías & Fabregat, 2002), recognized most members of the genus as belonging to two different species complexes, each centred around one of the two Linnaean species. The *S. chamaecyparissus* species complex includes 12 species native to Europe (France, Italy, Spain), while the *S. rosmarinifolia* species complex includes 7 species native to Europe (Iberian Peninsula) and Africa (Algeria, Morocco).

Several taxonomic treatments have been published for *Santolina*, but they are often at odds with each other (Carbajal & al., 2017). For instance, the two treatments for the European continent published by Guinea (1970, 1976) are very different from each other (López-Udías & Fabregat, 2002). In the last two decades, López-Udías and co-workers (López-Udías & al., 1997; López-Udías & Fabregat, 2002) and especially Rivero-Guerra (2008a,b, 2011) and Rivero-Guerra & Laurin (2012) have studied the *S. rosmarinifolia* complex, so that its nomenclature and taxonomy seem to have become more stable than in the past. On the contrary, there is no taxonomic treatment for the entire *S. chamaecyparissus* complex, although important contributions were published by Marchi and co-workers (Marchi & D'Amato, 1973; Marchi & al., 1979) and

Arrigoni (1977, 1979, 1982, 2018) for Italy, by Tison & Foucault (2014) and Tison & al. (2014) for France, and by Carbajal & al. (2017, 2019) for Spain. Here we present a nomenclatural revision that is part of an ongoing study of integrative taxonomy of the *S. chamaecyparissus* complex. In this context, we designate nomenclatural types for 28 names and discuss the application of many names in detail.

■ MATERIALS AND METHODS

Currently accepted names, homotypic and heterotypic synonyms within the *Santolina chamaecyparissus* complex were taken from the *Med-Checklist* (Greuter, 2008). Additional names not included by Greuter (2008) were taken from the literature (Salisbury, 1796; Poiret, 1805; Jordan & Fourreau, 1869; Sennen & Pau, 1907; Sennen & Elias, 1929; Bolós & Vigo, 1987). The protologues were investigated in order to search for original material. The following herbaria were consulted: B, BM, BR, C, COI, E, FI, G, H, K, L, LINN, LY, MPU, P, PAL, PAL-Gr, SLA, and UPS. All names that were found to lack a nomenclatural type are typified here, according to the *International Code of Nomenclature for algae, fungi, and plants* (Turland & al., 2018, *ICN* hereafter).

■ NOMENCLATURE OF THE SANTOLINA CHAMAECYPARISSUS COMPLEX

Here we treat in detail all the names that have been previously applied to members of the *Santolina chamaecyparissus* complex. The treatment is organized alphabetically by

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basionym, with a synonymy and typification following the discussion of each name. In Table 1, a list of the accepted names, with their heterotypic synonyms, is provided.

***Santolina benthamiana*.** — Bentham (1826) published the name *S. pectinata* to describe plants from the Pyrenees (France), but this binomial was already validly published by Lagasca (1816) to describe a different taxon from southern Spain. Accordingly, Jordan & Fourreau (1869) proposed the name *S. benthamiana* Jord. & Fourr. as a replacement name, which is typified by the type of the replaced synonym (Art. 7.4 of the *ICN*). Bentham's original material is known to be conserved in K (Stafleu

& Cowan, 1976), where we found two well-preserved specimens (K barcodes K000929471 and K000929472) mounted on the same sheet. The specimen K000929471 was collected between Arles and Prats-de-Mollo (Pyrénées-Orientales, France), and K000929472 was collected at the hermitage of Saint Audiol, near Prats-de-Mollo. Both specimens show the same morphology, and both localities are cited in the protologue (Bentham, 1826). We designate below the specimen K000929471 as the lectotype, since it comes from a population that is still extant (J.-M. Tison, pers. comm.). The lectotype shows long leaf segments (>3 mm) and glabrous involucre bracts. The sterile stems are clearly more tomentose than the fertile stems, which are slightly pubescent.

Table 1. The first column reports the accepted names listed in alphabetical order of their basionym (the currently accepted names are in bold). The second column reports the heterotypic synonyms (only the basionym).

Accepted name	Heterotypic synonym(s)
<i>S. benthamiana</i> Jord. & Fourr.	=? <i>S. brevicaulis</i> Jord. & Fourr. =? <i>S. chamaecyparissus</i> subsp. <i>pecten</i> Rouy var. <i>hispanica</i> Rouy = <i>S. chamaecyparissus</i> subsp. <i>pecten</i> Rouy var. <i>ruscinonensis</i> Rouy =? <i>S. intricata</i> Jord. & Fourr. =? <i>S. rigidula</i> Jord. & Fourr. = <i>S. valida</i> Jord. & Fourr.
<i>S. chamaecyparissus</i> L.	= <i>S. marchii</i> Arrigoni = <i>S. provincialis</i> Jord. & Fourr. = <i>S. tomentosa</i> Pers., nom. illeg.
<i>S. chamaecyparissus</i> var. <i>etrusca</i> Lacaita = <i>S. etrusca</i> (Lacaita) Marchi & D'Amato	
<i>S. chamaecyparissus</i> subsp. <i>magonica</i> O.Bolòs, Molin. & P.Monts. = <i>S. magonica</i> (O.Bolòs, Molin. & P.Monts.) Romo	= <i>S. chamaecyparissus</i> var. <i>teucrietorum</i> O.Bolòs & Vigo
<i>S. chamaecyparissus</i> var. <i>pectinata</i> f. <i>insularis</i> Gennari ex Fiori = <i>S. insularis</i> (Gennari ex Fiori) Arrigoni	
<i>S. chamaecyparissus</i> var. <i>vedranensis</i> O.Bolòs & Vigo = <i>S. vedranensis</i> (O.Bolòs & Vigo) L.Sáez, M.Serrano, S.Ortiz & R.Carbaljal	
<i>S. corsica</i> Jord. & Fourr.	
<i>S. decumbens</i> Mill.	= <i>S. diversifolia</i> Jord. & Fourr. = <i>S. incana</i> Lam. = <i>S. villosissima</i> Poir.
<i>S. ericoides</i> Poir.	= <i>S. brevifolia</i> Jord. & Fourr. = <i>S. chamaecyparissus</i> var. <i>mariolensis</i> O.Bolòs & Vigo = <i>S. chamaecyparissus</i> var. <i>virens</i> Willk. = <i>S. glabrescens</i> Jord. & Fourr. = <i>S. homophylla</i> Jord. & Fourr. = <i>S. microcephala</i> Jord. & Fourr.
<i>S. ligustica</i> Arrigoni	
<i>S. neapolitana</i> Jord. & Fourr.	= <i>S. chamaecyparissus</i> var. <i>pectinata</i> Fiori f. <i>semi-virens</i> Fiori
<i>S. pinnata</i> Viv.	
<i>S. villosa</i> Mill.	
<i>S. virens</i> Mill.	= <i>S. ×eliasii</i> Sennen = <i>S. pau</i> Sennen & Elias = <i>S. ×pervirens</i> Sennen & Pau = <i>S. teretifolia</i> Sennen & Elias = <i>S. teretifolia</i> var. <i>flexuosa</i> Sennen & Elias

This morphology is congruent with the current application of the name *S. benthamiana* (Tison & Foucault, 2014; Carbajal & al., 2019).

After Jordan & Fourreau (1869), two isonyms were published (Pau, 1891: 42; Rouy, 1891: 263). Rouy (1903) published *S. chamaecyparissus* subsp. *pecten*, citing *S. pectinata* and providing a short diagnosis. According to Art. 6.13 of the ICN, it may be considered either as a replacement name for *S. pectinata* or as a new name based on the original description provided by the author. We consider it as a replacement name, homotypic with *S. pectinata* Benth. The name *S. chamaecyparissus* var. *pectinata* Fiori (Art. 46.4) is typified by the type of *S. pectinata* (Art. 7.4). The epithet at the subspecific level for this taxon would be “*pecten*”. The combination “*Santolina pinnata* subsp. *benthamiana*” published by Guinea (1970) is not valid according to Art. 41.5.

Santolina benthamiana Jord. & Fourr., Icon. Fl. Eur. 2: 10. 1869 ≡ *Santolina pectinata* Benth., Cat. Pl. Pyrénées: 117. 1826, nom. illeg., non Lag. 1816 ≡ *Santolina chamaecyparissus* subsp. *pecten* Rouy, Fl. France 8: 224. 1903 ≡ *Santolina chamaecyparissus* var. *pectinata* Fiori in Fiori & al., Fl. Italia 3(1): 270. 1903 (Art. 46.4) – **Lectotype (designated here)**: France, Occitanie, Pyrénées-Orientales, Prats-de-Mollo, inter Arles et Prats-de-Mollo, 11 Jun 1825, *G. Bentham* 573 (K barcode K000929471 [photo!]).

***Santolina brevicaulis*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen collected before the publication of the name could be located (we searched in BM, K, LY, MPU, and P, where Jordan’s specimens are supposed to be conserved; Stafleu & Cowan, 1979), as such the illustration published in the protologue is selected below as the lectotype. The detailed lectotype illustration represents a plant morphologically intermediate between *S. ericoides* Poir. (see below the discussion about this name) and *S. benthamiana*. Indeed, the leaf segments are short as in *S. ericoides*, but the leaves of the sterile stems are clearly more tomentose than the ones of the fertile stems, a feature typical of *S. benthamiana* (Tison & Foucault, 2014). Moreover, these plants were reported to occur near Millas (France), in the Eastern Pyrenees (Jordan & Fourreau, 1869), which is where *S. ericoides* and *S. benthamiana* are sympatric (Tison & Foucault, 2014). We tentatively consider *S. brevicaulis* to be a synonym of *S. benthamiana*. However, further studies are needed to determine whether the name applies to hybrid plants.

Santolina brevicaulis Jord. & Fourr., Icon. Fl. Eur. 2: 10. 1869 ≡ *Santolina chamaecyparissus* var. *incana* subvar. *brevicaulis* (Jord. & Fourr.) Rouy, Fl. France 8: 222. 1903 ≡ *Santolina chamaecyparissus* var. *brevicaulis* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 41. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina brevicaulis* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 230. 1869.

***Santolina brevifolia*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen collected before the publication of the name could be located (we searched in BM, K, LY, MPU, and P, where Jordan’s specimens are supposed to be conserved; Stafleu & Cowan, 1979), as such the illustration published as part of the protologue is selected as the lectotype. The morphology of the plant depicted in the lectotype illustration is compatible with the type of *S. ericoides*, since the whole plant is slightly pubescent, and the leaf segments are short. In addition, this species was described from Nîmes (Occitanie, France), which is fully within the range of *S. ericoides* (Tison & Foucault, 2014; Carbajal & al., 2019).

Santolina brevifolia Jord. & Fourr., Icon. Fl. Eur. 2: 11. 1869 ≡ *Santolina chamaecyparissus* var. *incana* subvar. *brevifolia* (Jord. & Fourr.) Rouy, Fl. France 8: 222. 1903 ≡ *Santolina chamaecyparissus* var. *brevifolia* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina brevifolia* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 234. 1869.

***Santolina chamaecyparissus*.** — Linnaeus (1753) published this name and provided a short diagnosis with vague information about the distribution range of this species (“*Habitat in Europa australi*”). Arrigoni (1979) designated a specimen at LINN as the lectotype. It is a tomentose and greyish plant, especially on the sterile stems; the fertile stems are not branched and end with capitula that are 6–8 mm wide. The flowers do not cover the involucre bracts, which are pubescent. The leaves are longer (2–3 cm) at the bottom of the stems and become shorter towards the top. The leaf petioles are evident and long, while the leaf segments are short (1–2 mm) and spaced-out.

Currently (Greuter, 2008), the name *S. chamaecyparissus* is applied to the commonly cultivated *Santolina* that, as demonstrated by Marchi & D’Amato (1973), is pentaploid. Arrigoni (1979) proposed the name *S. marchii* to describe this pentaploid species. Indeed, Arrigoni (1979) considered the Linnaean type as incomplete and ambiguous. According to him, the type in LINN lacked important diagnostic features (the colour of the flowers is not recognizable, the sterile stems are not well developed, and the information about the provenance of the specimen is vague), and it is impossible to refer it to any natural population. Despite Arrigoni’s arguments, we believe that the type in LINN matches well with the morphology of the pentaploid cultivated plants, and we do not consider it as incomplete since: (1) only *S. ligustica* Arrigoni and *S. pinnata* Viv. show flowers coloured different from yellow, and both species are very distinct if compared to the pentaploid plants (Arrigoni, 1982, 2018); (2) the specimen in LINN shows two short sterile stems, which are however well developed and show long leaves; and (3) the information about the provenance of the specimen is irrelevant, because this pentaploid plant is of unknown origin, and no natural population is reported

to occur anywhere (Marchi & D'Amato, 1973; Greuter, 2008; Tison & Foucault, 2014; Carbajal & al., 2019).

Regarding the putative ambiguity of the specimen, the morphological affinity between the pentaploid cultivated plants and *S. insularis* (Gennari ex Fiori) Arrigoni is well known (Marchi & D'Amato, 1973; Arrigoni, 1979). However, the lectotype of *S. insularis* shows some morphological features that clearly distinguish it from the cultivated pentaploid plants: the fertile stems are branched, especially in the middle portion; the leaf segments are less spaced-out and the leaves at the bottom of the stems show longer (1.5–3.5 mm) segments; the leaf petioles are shorter. In conclusion, based on the lectotype, we can confirm the current application of the name *S. chamaecyparissus* to the pentaploid and commonly cultivated *Santolina*. If future morphological studies highlight some ambiguity of the type in LINN, it may be necessary to designate an epitype. In this case, we suggest designating one of the specimens in PI that we collected in 2020 near Le Luc (Provence, France: *Santolina chamaecyparissus* L., France, Provence-Alpes-Côte d'Azur, Var, Le Luc, 30 Jun 2020, A. Giacò & L. Peruzzi s.n. [PI Nos. 034970, 034971, 034972, 034973 & 034974]). Indeed, these specimens were collected in one of the few naturalised populations of this species known from France (J.-M. Tison, pers. comm.), growing in the same area from where also *S. provincialis* Jord. & Fourr. (= *S. chamaecyparissus*; see below) was described.

Santolina chamaecyparissus L., Sp. Pl.: 842. 1753 ≡ *Santolina cupressiformis* Lam., Fl. Franç. 2: 42. 1779, nom. illeg. (Art. 7.5) ≡ *Santolina pallida* Salisb., Prodr. Stirp. Chap. Allerton: 189. 1796, nom. illeg. (Art. 7.5) – Lectotype designated by Arrigoni in Webbia 34(1): 260. 1979: Herb. Linnaeus No. 985.1 (LINN [photo!]).

***Santolina chamaecyparissus* var. *etrusca*.** — According to Peruzzi & al. (2015), this name has yet to be typified. In the protologue, Lacaita (1925) cited two gatherings (syntypes), one collected by Groves in 1875 near Monte Amiata (Tuscany, Italy; BM barcode BM000909643) and another collected on 14 July 1924 near Radicofani (Tuscany, Italy; BM barcodes BM000909644, BM000909645, FI barcode FI058570) by himself. On each of the three BM specimens, Lacaita corrected the original identification by adding “var. *etrusca* mihi CCL [Charles Carmichael Lacaita]”, so it is clear that they are original material. BM000909645 is the most complete specimen, since there is at least one fragment composed of both fertile and sterile stems. We designate it as the lectotype. The lectotype shows densely tomentose sterile stems and pubescent fertile stems. The fertile stems are branched, especially in the middle-upper portion; the leaves are generally 1.5–3 cm long, and the leaf segments are 1–2.5 mm long. The capitula are 6–8 mm wide; the involucre bracts are pubescent. The flowers, as reported on the label, are citrine-yellow coloured. This morphology is congruent with the current application of the name to a taxon endemic to central Italy (Lacaita, 1925; Arrigoni, 1979, 1982, 2018; Greuter, 2008; Bartolucci & al., 2018).

Santolina chamaecyparissus var. *etrusca* Lacaita in Nuovo Giorn. Bot. Ital. 32: 215–216. 1925 ≡ *Santolina etrusca* (Lacaita) Marchi & D'Amato in Inform. Bot. Ital. 5: 93. 1973 ≡ *Santolina pinnata* subsp. *etrusca* (Lacaita) Guinea ex C. Jeffrey in Bean, Trees & Shrubs, ed. 8, 5: 323. 1980 – **Lectotype (designated here):** Italy, Tuscany, Radicofani, stony valley of Orcia, 14 Jul 1924, C. Lacaita 26906 (BM barcode BM000909645 [photo!]; isolectotypes: BM barcode BM000909644 [photo!], FI barcode FI058570!).

***Santolina chamaecyparissus* subsp. *magonica*.** — The holotype is a tomentose plant. The fertile stems are branched in the lower portion and the branches are erecto-patent. The leaves (<2 cm), as well as the leaf segments (<2 mm), are short. The capitula are 6–7 mm wide, and the involucre bracts are pubescent. This morphology matches the protologue and the current application of the name to a taxon endemic to Menorca and Mallorca (Balearic Islands, Spain) (Carbajal & al., 2019).

Santolina chamaecyparissus subsp. *magonica* O.Bolòs, Molin. & P.Monts. in Acta Geobot. Barcinon. 5: 107. 1970 ≡ *Santolina chamaecyparissus* var. *magonica* (O.Bolòs, Molin. & P.Monts.) O.Bolòs & Vigo in Collect. Bot. (Barcelona) 17(1): 90. 1987 ≡ *Santolina magonica* (O.Bolòs, Molin. & P.Monts.) Romo, Fl. Silvestres Baleares: 303. 1994 – Holotype: Spain, Balearic Islands, Menorca, Tirant, 15 May 1875, F. Rodríguez 30057 (BC barcode BC-30057 [photo!]).

***Santolina chamaecyparissus* var. *mariolensis*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). The holotype is a slightly pubescent plant. The leaves (<2 cm), as well as the leaf segments (<2 mm), are short. The capitula are 5–6 mm wide, and the involucre bracts are glabrous. This morphology is compatible with the type of *S. ericoides*. Moreover, it was collected in Serra de Mariola (Valencian Community, Spain), fully within the range of *S. ericoides* (Carbajal & al., 2019).

Santolina chamaecyparissus var. *mariolensis* O.Bolòs & Vigo in Collect. Bot. (Barcelona) 17(1): 90. 1987 – Holotype: Spain, Valencian Community, Serra de Mariola, 520 m, s.d., A. Bolòs & O. Bolòs s.n. (BC barcode BC-150851 [photo!]).

***Santolina chamaecyparissus* subsp. *pecten* var. *hispanica*.** — In the protologue, Rouy (1903) mentioned the gathering “Soc. Dauph. 435”. We searched in FI, G, GB, LY, MPU, and P where Rouy's material is known to be conserved (Stafleu & Cowan, 1983), and found only one specimen in Rouy's herbarium at LY (barcode LY0715656) bearing the label “Société Dauphinoise 435”. We were not able to locate any duplicates of this specimen. While it is possible that this was the only specimen used by Rouy to prepare the protologue, there is no definitive evidence to support this. As such, we designate this specimen as a lectotype rather than treat it as a holotype. As is the case for the type of *S. brevicaulis*, this specimen is morphologically

intermediate between *S. benthamiana* and *S. ericoides*. Indeed, the leaf segments are short as in *S. ericoides* (<2 mm), but the leaves of the sterile stems are clearly more tomentose than those of the fertile stems, as in *S. benthamiana* (Tison & Foucault, 2014). Moreover, the type specimen was collected in the eastern Spanish Pyrenees, where the ranges of the two species overlap (Carbajal & al., 2019). We tentatively consider *S. chamaecyparissus* subsp. *pecten* var. *hispanica* a synonym of *S. benthamiana*, but more studies are needed to clarify its status as a potential hybrid.

Santolina chamaecyparissus subsp. *pecten* var. *hispanica* Rouy, Fl. France 8: 225. 1903 – **Lectotype (designated here)**: Spain, Aragon, Broto, Jul 1873, *A. Autheman s.n.* (LY barcode LY0715656 [photo!]).

***Santolina chamaecyparissus* subsp. *pecten* var. *ruscinensis*.** — In the protologue, Rouy cited the gathering “Relic. Maill. 1277”. We searched in FI, G, GB, LY, MPU and P where Rouy’s material is known to be conserved (Stafleu & Cowan, 1983), and found only one specimen in Rouy’s herbarium at LY (barcode LY0003145) bearing the label “Reliquiae Mailleanae 1277”. We designate it as the lectotype. We found several additional specimens belonging to the same gathering, and they have to be considered isoelectotypes. While it is possible that LY0003145 was the only specimen used by Rouy to prepare the protologue, there is no definitive evidence to support this. As such, we designate this specimen as a lectotype rather than treat it as a holotype. The lectotype specimen was collected at the same location as the type of *S. benthamiana* and shows the same set of morphological features: the leaf segments are generally longer than 3 mm, and the leaves of the sterile stems are more tomentose than the ones of the fertile stems (Tison & Foucault, 2014; Carbajal & al., 2019). Given the geographic provenance and the shared morphology, we consider this name to be a synonym of *S. benthamiana*.

Santolina chamaecyparissus subsp. *pecten* var. *ruscinensis* Rouy, Fl. France 8: 225. 1903 – **Lectotype (designated here, possibly holotype)**: France, Occitanie, Pyrénées-Orientales, Prats-de-Mollo, Jun 1846, *A. Irat s.n.* (LY barcode LY0003145 [photo!]; isoelectotypes: LY barcode LY0341058 [photo!], P barcodes P00752629 [photo!], P00752630 [photo!], P00752631 [photo!], P00752632 [photo!], P00752633 [photo!], P00752636 [photo!], P00752673 [photo!], P00752674 [photo!] & P03315514 [photo!]).

***Santolina chamaecyparissus* var. *pectinata* f. *insularis*.** — The lectotype is a greyish and tomentose plant, especially on the sterile stems. The fertile stems are branched in the middle portion. The leaves at the bottom of the stems are 2–4 cm long, with leaf segments 1.5–3 mm long. The leaves become shorter towards the top of the stems, and the leaf segments become very short too (<1 mm). The capitula are 5–7 mm wide, and the involucre bracts are tomentose. This morphology

matches well with the protologue and with the current application of the name to a taxon endemic to Sardinia, Italy (Arrigoni, 1979, 1982, 2018; Bartolucci & al., 2018).

Santolina chamaecyparissus var. *pectinata* f. *insularis* Gennari ex Fiori in Fiori & al., Fl. Italia 3(1): 270. 1903 ≡ *Santolina chamaecyparissus* subsp. *insularis* (Gennari ex Fiori) Yeo in Bot. J. Linn. Soc. 70: 18. 1975 ≡ *Santolina insularis* (Gennari ex Fiori) Arrigoni in Webbia 34(1): 263. 1979 – Lectotype (designated by Arrigoni in Boll. Soc. Sarda Sci. Nat. 21: 338. 1982, as ‘holotype’): Italy, Sardinia, Monti d’Iglesias a S. Benedetto, s.d., *P. Gennari s.n.* (FI barcode FI002787!).

***Santolina chamaecyparissus* var. *pectinata* f. *semi-virens*.** — The lectotype shows densely tomentose sterile stems and pubescent fertile stems. The leaves are 2–4 cm long, and the leaf segments are 2–5 mm long. The capitula are 6–8 mm wide, and the involucre bracts are pubescent. This morphology is compatible with *S. neapolitana*. Moreover, it was collected on Monte Sant’Angelo (Campania, Italy), where *S. neapolitana* is native (Arrigoni, 1982, 2018; Del Guacchio & al., 2020).

Santolina chamaecyparissus var. *pectinata* f. *semi-virens* Fiori in Fiori & al., Fl. Italia 3(1): 270. 1903 ≡ *Santolina neapolitana* f. *semi-virens* (Fiori) Lacaita in Nuovo Giorn. Bot. Ital. 32: 219. 1925 – Lectotype (designated by Del Guacchio & al. in Phytotaxa 449: 224. 2020): Italy, Campania, Monte S. Angelo di Castellammare, 22 Aug 1891, *T. Caruel s.n.* (FI barcode FI058911!).

***Santolina chamaecyparissus* var. *teucrietorum*.** — The holotype is a tomentose plant. The fertile stems are branched and the branches are erecto-patent. The leaves (<2 cm), as well as the leaf segments (<2 mm), are short. The capitula are 4–6 mm wide, and the involucre bracts are pubescent. This morphology is compatible with the type of *S. magonica*. Moreover, it was collected on Mallorca (Balearic Islands, Spain), where *S. magonica* is reported to be native (Carbajal & al., 2019).

Santolina chamaecyparissus var. *teucrietorum* O.Bolòs & Vigo in Collect. Bot. (Barcelona) 17(1): 90. 198 – Holotype: Spain, Balearic Islands, Mallorca, Puig de Maçanella, 1250 m, s.d., *A. Bolòs & O. Bolòs s.n.* (BC barcode BC-137212 [photo!]).

***Santolina chamaecyparissus* var. *vedranensis*.** — The holotype is a slightly pubescent plant. The leaves are 2–4 cm long, and the leaf segments are short (<2 mm). The capitula are 10–12 mm wide, and the involucre bracts are slightly pubescent. The morphology of the holotype matches the current application of the name to a taxon restricted to the little islet of Es Vedrà (Balearic Island, Spain) (Carbajal & al., 2019).

Santolina chamaecyparissus var. *vedranensis* O.Bolòs & Vigo in Collect. Bot. (Barcelona) 17(1): 90. 1987 ≡ *Santolina*

magonica subsp. *vedranensis* (O.Bolòs & Vigo) Romo, Fl. Silvestres Balears: 305. 1994 = *Santolina vedranensis* (O.Bolòs & Vigo) L.Sáez, M.Serrano, S.Ortiz & R.Carbajal in Phytotaxa 291: 221. 2017 – Holotype: Spain, Balearic Islands, Es Vedrà, in rupibus maritimis calcareis, 19 Jul 1920, E. Gros s.n. (BC barcode BC-30056 [photo!]).

***Santolina chamaecyparissus* var. *virens*.** — In the protologue, *S. chamaecyparissus* var. *squarrosa*, *S. squarrosa*, and *S. ericoides* were cited as synonyms. According to Art. 6.13, *S. chamaecyparissus* var. *virens* may be considered either as a replacement name for one of these names or as a new name based on the description provided by the author. We consider it to represent a new name rather than a replacement name. We found well-preserved original material at COI and MPU, and select the specimen at COI as the lectotype. The specimen is from Willkomm's herbarium, and it was collected before the publication of the name. The type specimen is slightly pubescent, and the leaves (<2 cm), as well as the leaf segments (<2 mm), are short. The involucre bracts are glabrous. This morphology is compatible with the type of *S. ericoides*. Moreover, it was collected within the known range of *S. ericoides* (Carbajal & al., 2019).

Santolina chamaecyparissus var. *virens* Willk., Prodr. Fl. Hispan. 2(1): 80. 1865 – **Lectotype (designated here):** Spain, Madrid, Alcalá de Henares, dans champs pierreux incultes, 27 Jun 1854, J. Gay s.n. (COI barcode COI00035925 [photo!]).

***Santolina corsica*.** — According to Peruzzi & al. (2015), this name has yet to be typified. No specimen collected before the publication of the name could be located in Jordan's herbarium at LY or in other herbaria hosting Jordan's specimens (BM, K, MPU, and P; Stafleu & Cowan, 1979). The illustration published in the protologue is original material and we designate it as the lectotype. The plant depicted in the illustration is greyish and tomentose, especially on the sterile stems. The fertile stems are branched in the upper portion. The leaves are very long, and the leaf segments are very short. The involucre bracts are pubescent. This morphology is in accordance with the current application of the name to a taxon endemic to the islands of Corsica (France) and Sardinia (Italy) (Arrigoni, 1979, 1982, 2018; Tison & Foucault, 2014; Bartolucci & al., 2018). The combination "*Santolina pinnata* subsp. *corsica*" published by Guinea (1970) is not valid according to Art. 41.5.

Santolina corsica Jord. & Fourr., Icon. Fl. Eur. 2: 9. 1869 = *Santolina chamaecyparissus* var. *incana* subvar. *corsica* (Jord. & Fourr.) Rouy, Fl. France 8: 223. 1903 = *Santolina chamaecyparissus* var. *corsica* (Jord. & Fourr.) Fiori, Nuov. Fl. Italia 2: 659. 1927 – **Lectotype (designated here):** [illustration] "*Santolina corsica* Jord. et Fourr." in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 227. 1869.

***Santolina decumbens*.** — We searched for original material in BM and LINN, where Philip Miller's specimens are supposed to be conserved (Stafleu & Cowan, 1981). After Miller's death, his herbarium was purchased by Joseph Banks, and, in order to make Miller's specimens recognizable, Daniel C. Solander annotated them with notes such as "Herb. Mill." or "Hort. Chels." (Britten, 1913). Our search led to two specimens.

One specimen (BM barcode BM000909659 [photo!]) is from Miller's herbarium, since "Herb. Mill." is written on the top of the sheet. This specimen does not include any label or annotation by Miller, and instead it was likely Solander who identified it as "*Santolina decumbens* Mill. Dict." In 1913, this specimen was identified again by James Britten as *S. decumbens*. Although the specimen is definitely from Miller's herbarium, it cannot be considered as original material.

The second specimen (BM barcode BM000909653 [photo!]) was collected in 1727 in the Chelsea Garden, when Miller was the director in charge. It was identified with the polynomial "*Santolina repens* & *canescens*", that is listed in the eighth edition of the *Gardeners dictionary* (Miller, 1768) as a synonym of *S. decumbens*. However, its morphology is in serious conflict with the protologue. According to the protologue, *S. decumbens* has short stems and finely indented leaves, while this specimen clearly shows long stems and long and spaced-out leaf segments. Even if it could be considered original material, this specimen is not suitable for lectotypification under Art. 9.19(c).

In absence of suitable original material, a neotype should be designated (Art. 9.8). Currently, the name *S. decumbens* is applied to plants endemic to Provence in France (Greuter, 2008; Tison & Foucault, 2014). We designate as neotype the specimen P barcode P00113904, collected on Mont Caume (Provence). It is a whitish and densely tomentose plant. The stems, as well as the leaves (<2 cm) and the leaf segments (<2 mm), are short. This morphology fits well with the protologue (Miller, 1768) and with the current application of the name (Tison & Foucault, 2014).

Santolina decumbens Mill., Gard. Dict., ed. 8: *Santolina* no. 3. 1768 – **Neotype (designated here):** France, Provence-Alpes-Côte d'Azur, Mont Caume, 23 Jun 1972, L. Mercurin s.n. (P barcode P00113904 [photo!]).

***Santolina diversifolia*.** — This name was not listed as synonym of any accepted name by Greuter (2008). We found three specimens belonging to the same gathering that were once mounted on the same sheet before the digitalization of LY (M. Thiebaut, pers. comm.). The original label is attached to LY barcode LY0826364, while the label on the other two specimens is a copy of the original. As reported on the label, the specimens were collected at Montagne de Lure in Provence, France, and planted in Jordan's garden. The original collection location of the specimens matches that cited in the protologue, and they were prepared from cultivated plants in 1864. The three specimens share the same morphological features. They are densely tomentose plants; the involucre bracts are

pubescent; the leaves are 1.5–2.5 cm long, and the leaf segments are short (<2 mm). The specimen LY0826364 is the best-preserved one, so that it is designated below as the lectotype. The morphology of the lectotype is compatible with the type of *S. decumbens*. Moreover, the location where the lectotype was originally collected prior to cultivation is within the range of *S. decumbens* (Tison & Foucault, 2014).

Santolina diversifolia Jord. & Fourr., Icon. Fl. Eur. 2: 9. 1869 $\equiv$ *S. chamaecyparissus* var. *incana* subvar. *diversifolia* (Jord. & Fourr.) Rouy, Fl. France 8: 222. 1903 $\equiv$ *Santolina chamaecyparissus* var. *diversifolia* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: France, Provence-Alpes-Côte d’Azur, Montagne de Lure, 5 Jun 1864, *A. Jordan* s.n. (LY barcode LY0826364 [photo!]; isolectotypes: LY barcodes LY0826365 [photo!] & LY0826366 [photo!]).

***Santolina ×eliasii*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). In the protologue, the gathering number “3270” was cited. We found several specimens belonging to this gathering, and we select the best-preserved specimen in LY as the lectotype. The lectotype is a glabrous plant, with long leaves (1.5–2.5 cm) that are two-ways indented. The segments are very short and spaced-out. This morphology agrees with the type of *S. virens* (see below). In addition, the lectotype was collected in the middle valley of the Ebro river (Spain), within the known range of *S. virens* (Marcos & Burgaz, 1990; Carbajal & al., 2019).

Santolina ×eliasii Sennen in Bol. Soc. Ibér. Ci. Nat. 28(1–2): 31. 1929 – **Lectotype (designated here)**: Spain, Castile and León, Santa Gadea del Cid, bords du canal, 5 Aug 1917, *H. Elias* s.n. (LY barcode LY0341568 [photo!]; isolectotypes: LY barcode LY0341569 [photo!], SLA barcode SLA046473 [photo!]).

***Santolina ericoides*.** — In the protologue, the author stated that this species was cultivated at the “Jardin des Plantes” in Paris, but no specimens or illustrations were cited. The specimen P barcode P00752618 was in Poirét’s herbarium and is the only pertinent one found in P, where Poirét’s types are supposed to be conserved (we searched for material also in BR, FI, and UPS; Stafleu & Cowan, 1983). As is the case for many of Poirét’s specimens, there is no collection date indicated on the specimen (F. Jabbour, pers. comm.). On the label, the acronym “h.R.P.” is reported. It likely stands for “hortus Regius Parisiensis” (the Latin and older name for the Jardin des Plantes), so that the origin of the specimen corresponds to the protologue. However, it cannot definitively be considered original material because it is not possible to demonstrate that it was collected before the publication of the name. We conclude that the best option is to designate this specimen as a neotype.

Santolina ericoides was considered a heterotypic synonym of *S. villosa* Mill. by Greuter (2008). Nevertheless, Carbajal & al. (2019) stated that French and Spanish plants assigned to

S. villosa were quite different from the specimen they considered to be the “holotype” of *S. villosa* (P barcode P00680429 [photo!]). Their decision to apply the name *S. ericoides* instead of *S. villosa* to these plants was correct in the light of the neotype designated below for *S. ericoides*. Indeed, the type of *S. ericoides* is a slightly pubescent plant with short leaves (<2 cm), short leaf segments (<2 mm), and glabrous involucre bracts. This morphology matches with the description provided by Tison & Foucault (2014, under the name *S. villosa*), by Tison & al. (2014, under the name *S. villosa*), and by Carbajal & al. (2019). On the contrary, according to the protologue (Miller, 1768), *S. villosa* is a densely tomentose plant (see also below, under *S. villosa*). Consequently, based on the type below designated, we confirm the application of the name *S. ericoides* Poir. as circumscribed by Carbajal & al. (2019).

Santolina ericoides Poir. in Lamarck, Encycl. 6: 504. 1805 $\equiv$ *Santolina chamaecyparissus* var. *squarrosa* subvar. *ericoides* (Poir.) Rouy, Fl. France 8: 223. 1903 $\equiv$ *Santolina chamaecyparissus* subsp. *ericoides* (Poir.) Sennen & Elias in Bol. Soc. Ibér. Ci. Nat. 28(1–2): 32. 1929 – **Neotype (designated here)**: France, Île-de-France, Paris, Jardin des Plantes, s.d., *J.-L.M. Poirét* s.n. (P barcode P00752618 [photo!]).

***Santolina glabrescens*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen collected before the publication of the name could be located, as such the illustration published as part of the protologue is selected as the lectotype. The morphology of the plant depicted in the lectotype illustration, and the description in the protologue, are compatible with the type of *S. ericoides*. Indeed, the plant depicted in the illustration is almost glabrous, the involucre bracts are glabrous, and the leaves, as well as the leaf segments, are short. In addition, this species was described from Béziers (Occitanie, France), which is within the range of *S. ericoides* (Tison & Foucault, 2014; Carbajal & al., 2019).

In the protologue of *S. chamaecyparissus* var. *squarrosa* subvar. *laxa*, Rouy (1903) cited *S. glabrescens* as a synonym and provided a short description. According to Art. 6.13, this name may be considered either as a replacement for *S. glabrescens* or as a new name based on the original description. We consider it as a replacement name, that is automatically typified by the type of *S. glabrescens*.

Santolina glabrescens Jord. & Fourr., Icon. Fl. Eur. 2: 11. 1869 $\equiv$ *Santolina chamaecyparissus* var. *squarrosa* subvar. *laxa* Rouy, Fl. France 8: 223. 1903 $\equiv$ *Santolina chamaecyparissus* var. *glabrescens* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina glabrescens* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 233. 1869.

***Santolina homophylla*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen collected before the publication of this name could be located (we searched in BM, K, LY, MPU and P, where Jordan’s

specimens are supposed to be conserved; Stafleu & Cowan, 1979), as such the illustration published in the protologue is selected as the lectotype here. The plant depicted in the illustration is glabrous; the involucre bracts are glabrous, and the leaves are short as well as the leaf segments. This morphology is compatible with the type of *S. ericoides* (Tison & Foucault, 2014; Carbajal & al., 2019). Moreover, *S. homophylla* was described based on material from Millas (Pyrénées-Orientales, France), which is fully within the range of *S. ericoides* (Jordan & Fourreau, 1869; Tison & Foucault, 2014; Carbajal & al., 2019).

Santolina homophylla Jord. & Fourr., Icon. Fl. Eur. 2: 8. 1869
= *Santolina chamaecyparissus* var. *incana* subvar. *homophylla* (Jord. & Fourr.) Rouy, Fl. France 8: 223. 1903 = *Santolina chamaecyparissus* var. *homophylla* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 41. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina homophylla* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 223. 1869.

***Santolina incana*.** — No original material was found in B, FI, G, and P, where Lamarck’s specimens are supposed to be conserved (Stafleu & Cowan, 1979). As such we designate a neotype following Art. 9.8. In the protologue, *S. incana* is described as a woolly and whitish plant with short stalks and whitish leaves that are 14–18 mm long. This description matches the morphology of *S. decumbens* (Miller, 1768). However, *S. incana* was described based on material from Occitanie (France) near Nîmes (Lamarck, 1779), which is outside of the currently known range of *S. decumbens* (Tison & Foucault, 2014). Poiret (1805) included *S. incana* in his treatment, highlighting the possibility it was closely related to his *S. villosissima* Poir. (= *S. decumbens*), which is very common in Provence (France). Jordan & Fourreau (1869) reported *S. villosissima* as occurring near Toulon (Provence), but did not mention *S. incana* or any other woolly and whitish *Santolina* from Occitanie. In view of this, we suspect that Lamarck described *S. incana* from naturalized plants escaped from cultivation, or from relictual populations that are now extinct. We searched for specimens compatible with Lamarck’s description and collected in Nîmes in B, FI, G, LY, MPU, P, and SLA, but we did not find any material. In another treatment (Lamarck & Candolle, 1806), Lamarck mentioned Narbonne (Occitanie, France) as an additional location of occurrence for *S. incana*. We did locate a specimen in P (barcode P06898681), which was collected in Narbonne, and we designate it as neotype for *S. incana*. In the light of the type designated, *S. incana* has to be considered as a synonym of *S. decumbens*.

Santolina incana Lam., Fl. Franç. 2: 43. 1779 = *S. chamaecyparissus* var. *incana* (Lam.) DC., Prodr. 6: 35. 1838 – **Neotype (designated here)**: France, Occitanie, Aude, Narbonne, s.d., s.c. (P barcode P06898681 [photo!]).

***Santolina intricata*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen

collected before the publication of the name could be located (we searched in BM, K, LY, MPU, and P, where Jordan’s specimens are supposed to be conserved; Stafleu & Cowan, 1979). The illustration published in the protologue is original material and we designate it as the lectotype. As in the case of *S. brevicaulis* (see above), the illustration of *S. intricata* shows a plant morphologically intermediate between *S. ericoides* and *S. benthamiana*. This name was based on material from near Caudies, France (Jordan & Fourreau, 1869) where the ranges of *S. benthamiana* and *S. ericoides* overlap (Tison & Foucault, 2014). For the same reasons already discussed for *S. brevicaulis*, we tentatively consider *S. intricata* a synonym of *S. benthamiana*.

Santolina intricata Jord. & Fourr., Icon. Fl. Eur. 2: 11. 1869 = *Santolina chamaecyparissus* var. *intricata* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina intricata* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 232. 1869.

***Santolina ligustica*.** — The holotype is a tomentose plant with fertile stems that are branched mostly in the upper portion. The leaves are 2–3 cm long, and the leaf segments are 2–4 mm long. The capitula are small (3–5 mm), and the flowers are whitish. This morphology fully agrees with the protologue and the current application of the name to a taxon endemic to Liguria, Italy (Arrigoni, 1979, 1982, 2018; Bartolucci & al., 2018).

Santolina ligustica Arrigoni in Webbia 32(1): 129. 1977 – Holotype: Italy, Liguria, Deiva Marina, fra Piazza e Castagnola, zone ofiolitiche, 16 Jul 1975, P.V. Arrigoni & al. s.n. (FI barcode FI001816!).

***Santolina marchii*.** — Arrigoni (1977) proposed this name to describe the commonly cultivated and pentaploid *Santolina*. The holotype of *S. marchii* is a greyish and tomentose plant, especially on the sterile stems. The fertile stems are not branched. The leaves are longer at the bottom of the stems (2–3 cm) and become shorter towards the top. The leaf segments are short (<2 mm) and spaced-out. The capitula are 7 mm wide, and the involucre bracts are pubescent. The morphology of this specimen is compatible with the type of *S. chamaecyparissus*, and, therefore, we consider *S. marchii* as a synonym.

Santolina marchii Arrigoni in Webbia 32(1): 131. 1977 – Holotype: Italy, Tuscany, Pisa, proviene per talea dall’esemplare coltivato nell’Orto Botanico di Pisa, 27 Jun 1967, P. Marchi s.n. (FI barcode FI001815!).

***Santolina microcephala*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). We located only one specimen (LY barcode LY0826375) in Jordan’s herbarium identified as *S. microcephala*. It was collected in 1850 at Hellin (Castilla-La Mancha, Spain), the same locality cited in the protologue. A label gives “*S. microcephala*

Jord. & Fourr., Lectotypus D. Rivera, 18 October 1984”, although no evidence of a formal publication was found. We designate this specimen as the lectotype. The type specimen is a slightly pubescent plant. The involucre bracts are glabrous, and the leaves are short (<2 cm), as well as the leaf segments (<2 mm). This morphology is compatible with the type of *S. ericoides*. Moreover, the lectotype was collected within the known range of *S. ericoides* (Carbajal & al., 2019).

Santolina microcephala Jord. & Fourr., Icon. Fl. Eur. 2: 11. 1869 – **Lectotype (designated here)**: Spain, Castilla-La Mancha, Hellin, Collines a Hellin, 24 May 1850, *J. Gay s.n.* (LY barcode LY0826375 [photo!]).

***Santolina neapolitana*.** — The lectotype shows densely tomentose sterile stems and pubescent fertile stems. The leaves are 2–4 cm long; the leaf segments are 1.5–4 mm long. The capitula are 6–8 mm wide; the involucre bracts are pubescent. This morphology matches with the protologue and the current application of the name to a taxon endemic to Campania, Italy (Arrigoni, 1982, 2018, Del Guacchio & al., 2020).

Santolina neapolitana Jord. & Fourr., Icon. Fl. Eur. 2. 1869 ≡ *Santolina chamaecyparissus* var. *neapolitana* (Jord. & Fourr.) Fiori, Nuov. Fl. Italia 2: 660. 1927 ≡ *Santolina pinnata* subsp. *neapolitana* (Jord. & Fourr.) Guinea ex C. Jeffrey in Bean, Trees & Shrubs, ed. 8, 5: 322. 1980 – Lectotype (designated by Del Guacchio & al. in Phytotaxa 449: 224. 2020): Italy, Campania, Castellammare di Stabia, Monte Sant’Angelo, *E. Cosson s.n.* (LY barcode LY0826374 [photo!]).

***Santolina paui*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). In the protologue (Sennen & Elias, 1929), the gatherings “3269” and “4340” are cited. We found four specimens belonging to the first gathering and two specimens belonging to the latter. We designate here the specimen LY barcode LY0341676 (gathering “3269”) as the lectotype because it is the best-preserved one. The lectotype agrees with the type of *S. virens*. Indeed, it is a fully glabrous plant, with long leaves (1.5–2.5 cm) that are two-ways indented. The segments are very short and spaced-out. In addition, the lectotype was collected in the middle valley of the Ebro river (Spain), within the known range of *S. virens* (Marcos & Burgaz, 1990; Carbajal & al., 2019).

Santolina paui Sennen & Elias in Bol. Soc. Ibér. Ci. Nat. 28 (1–2): 32. 1929 – **Lectotype (designated here)**: Spain, Castile and León, Santa Gadea del Cid, bords du canal, 500 m, 12 Aug 1917, *H. Elias s.n.* (LY barcode LY0341676 [photo!]; isolectotypes: LY barcode LY0341677 [photo!], P barcode P00752598 [photo!], SLA barcode SLA046497 [photo!]).

***Santolina xpervirens*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). In the

protologue (Sennen & Pau, 1907), H. Elias is mentioned as the collector. We found several specimens collected by Elias in the same location cited in the protologue, but they were all collected after the publication of the name. Since there is no specimen that can be considered original material, a neotype should be designated. The specimen P barcode P03277835 is the best-preserved one collected by H. Elias, and we designate it as the neotype. The neotype agrees with *S. virens*. Indeed, it is a fully glabrous plant, with long leaves (1.5–2.5 cm) that are two-ways indented. The segments are very short and spaced-out. This morphology agrees with the type of *S. virens*. In addition, the neotype was collected in the middle valley of the Ebro river (Spain), within the known range of *S. virens* (Marcos & Burgaz, 1990; Carbajal & al., 2019).

Santolina xpervirens Sennen & Pau in Bol. Soc. Aragonesa Ci. Nat. 6: 25. 1907 – **Neotype (designated here)**: Spain, Castile and León, Miranda de Ebro, 29 Jun 1908, *H. Elias s.n.* (P barcode P03277835 [photo!]; isolectotype: P barcode P03315504 [photo!]).

***Santolina pinnata*.** — The neotype was collected in Apuan Alps (Italy). It is a fully glabrous plant with long leaves (2–4 cm) and long segments (2–5 mm). It conforms to the current application of this name to a taxon endemic to the Apuan Alps in Tuscany, Central Italy (Arrigoni, 1979, 1982, 2018; Bartolucci & al., 2018).

Santolina pinnata Viv., Elench. Pl.: 31. 1802 ≡ *Santolina leucantha* Bertol., Amoen. Ital.: 43. 1819, nom. illeg. (Art. 52.1 and 52.2 of the ICN) – Neotype (designated by Garbari & Bechi in Mem. Accad. Lunigianese Sci. “Giovanni Capellini”, Sci. Nat. Fis. Mat. 60–61: 165. 1992): Italy, Tuscany, Forno, ad scaturigines Frigidæ supra Fornole, 1807, *A. Bertoloni s.n.* (BOLO!).

***Santolina provincialis*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). One specimen (LY barcode LY0826377) in Jordan’s herbarium bears the label “*Santolina provincialis* J. et F.”, written in Jordan’s handwriting. It was collected in 1862 at the locality cited in the protologue. We designate it as the lectotype. We found other specimens identified as *S. provincialis* in Jordan’s herbarium, but they cannot be considered original material, since they were collected from Jordan’s garden after the publication of the name. The lectotype is a greyish and tomentose plant, especially on the sterile stems. The fertile stems are branched in the lower-middle portion. The leaves (2–3 cm) are longer at the bottom of the stems and become shorted towards the top. The leaf segments are short (<2 mm) and spaced-out. The capitula are 6–8 mm wide, and the involucre bracts are pubescent. The morphology of the type specimen is compatible with the type of *S. chamaecyparissus*. Moreover, small naturalised populations of the latter species are still reported in Provence, France (Tison & Foucault, 2014), and one of them occurs approximately in the same

location where *S. provincialis* was collected (J.-M. Tison, pers. comm.).

In the protologue of *S. chamaecyparissus* var. *lanata*, Rouy (1903) cited *S. provincialis* and *S. sericea* Jord. & Fourr. (the latter is member of the *S. rosmarinifolia* complex) as synonyms and provided a short description. According to Art. 6.13, it may be considered either as a replacement name for one of these names or as a new name based on the original description provided by the author. We treat it as a replacement name for *S. provincialis*. In the same paragraph, Rouy (1903) also described *S. chamaecyparissus* var. *lanata* subvar. *heterophylla*, that is illegitimate with respect to its autonym (Art. 11.6).

Santolina provincialis Jord. & Fourr., Icon. Fl. Eur. 2: 9. 1869 = *Santolina chamaecyparissus* var. *lanata* Rouy, Fl. France 8: 223. 1903 = *Santolina chamaecyparissus* var. *lanata* subvar. *heterophylla* Rouy, Fl. France 8: 223. 1903, nom. illeg. = *Santolina chamaecyparissus* var. *provincialis* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: France, Provence-Alpes-Côte d’Azur, Var, Le Luc, sur les vieux murs del ter-rains jurassiques de la vallée des Muraines, 29 Jun 1862, *H. Hanry s.n.* (LY barcode LY0826377 [photo!]).

***Santolina rigidula*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). We located three specimens in Jordan’s herbarium that were collected at Perpignan, the location cited in the protologue. The collection date is reported only on the label of LY barcode LY0826378. The other two specimens lack a date of collection, and while they may belong to the same gathering, this cannot be stated with certainty. Since LY0826378 is the only one that can be considered original material, we designate it as the lectotype.

As in the case for the type of *S. brevicaulis*, this specimen is morphologically intermediate between *S. benthamiana* and *S. ericoides*. Indeed, the leaf segments are short as in *S. ericoides* (<2 mm), but the leaves of the sterile stems are clearly more tomentose than those of the fertile stems, as in *S. benthamiana* (Tison & Foucault, 2014). Moreover, the type specimen was collected near Perpignan (Pyrénées-Orientales, France), where the ranges of the two species overlap (Tison & Foucault, 2014). We tentatively consider *S. rigidula* a synonym of *S. benthamiana*, but more studies are needed to clarify its status as a potential hybrid.

Santolina rigidula Jord. & Fourr., Icon. Fl. Eur. 2: 10. 1869 = *Santolina chamaecyparissus* var. *rigidula* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: France, Occitanie, Pyrénées-Orientales, Perpignan, Estagel, Jun 1838, *s.c.* (LY barcode LY0826378 [photo!]; isolectotypes: LY barcodes LY0341579 [photo!] & LY0341580 [photo!]).

***Santolina teretifolia*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). In the

protologue, the gathering “3267” is cited. We found several replicates, and we select the best-preserved specimen (MPU bar-code MPU016414) as the lectotype. The lectotype agrees with the current delimitation of *S. virens*. Indeed, it is a fully glabrous plant, with long leaves (1.5–2.5 cm) that are two-ways indented. The segments are very short and spaced-out. This morphology agrees with the type of *S. virens*. In addition, the lectotype was collected in the middle valley of the Ebro River (Spain), within the known range of *S. virens* (Marcos & Burgaz, 1990; Carbajal & al., 2019).

Santolina teretifolia Sennen & Elias in Bol. Soc. Ibér. Ci. Nat. 28(1–2): 30. 1929 – **Lectotype (designated here)**: Spain, Castile and León, Santa Gadea del Cid, bords du Canal, 500 m, 12 Jul 1917, *H. Elias s.n.* (MPU barcode MPU 016414 [photo!]; isolectotypes: LY barcode LY0340518 [photo!], P barcodes P00752596 [photo!] & P03277836 [photo!], SLA barcode SLA046471 [photo!]).

***Santolina teretifolia* var. *flexuosa*.** — In the protologue, the gathering “4339” is cited. We located several replicates and select the best-preserved specimen (MPU barcode MPU016415) as lectotype. The lectotype of *S. teretifolia* var. *flexuosa* agrees with the current delimitation of *S. virens*. Indeed, it is a fully glabrous plant, with long leaves (1.5–2.5 cm) that are two-ways indented. The segments are very short and spaced-out. In addition, the lectotype was collected in the middle valley of the Ebro River (Spain), within the known range of *S. virens* (Marcos & Burgaz, 1990; Carbajal & al., 2019).

Santolina teretifolia var. *flexuosa* Sennen & Elias in Bol. Soc. Ibér. Ci. Nat. 28(1–2): 30. 1929 – **Lectotype (designated here)**: Spain, Castile and León, Montañana, bords herbeux de l’Ebre, 28 Jun 1919, *H. Elias s.n.* (MPU barcode MPU016415 [photo!]; isolectotypes: LY barcode LY0340519 [photo!], SLA barcode SLA046472 [photo!]).

***Santolina tomentosa*.** — Persoon (1807) published the name *S. tomentosa*, but it was already used by Lamarck (1779) for a different taxon, now treated as a member of *Otanthus Hoffmanns. & Link* (The Plant List, 2020). The name *S. chamaecyparissus* subsp. *tomentosa* Arcang. (Art. 46.4) is typified by the type of *S. tomentosa* Pers., non Lam. (Art. 7.4). In the protologue of *S. tomentosa* (Persoon, 1807), the author stated that it could correspond to *S. squarrosa* Willd. (non L.). As such, *S. tomentosa* is not typified automatically by the same type of *S. squarrosa*. We located two specimens at L (2D barcodes L.3676273 and L.3676275) that are conserved in Persoon’s herbarium. However, the date of collection is not reported, so that it is impossible to demonstrate that they are original material. Both specimens show the same morphology. They are tomentose plants, especially on the sterile stems. The leaves are longer at the bottom of the stems (1.5–3 cm) and become shorter towards the top. The leaf segments are short (<2 mm) and spaced-out, and the leaf petioles are long. The capitula are 6–8 mm wide, and the involucral bracts are pubescent.

We designate as neotype the specimen L.3676273 since it shows more fertile and sterile stems than L.3676275. The name *S. chamaecyparissus* subsp. *tomentosa* was provisionally used by Carbajal & al. (2019) to describe some Spanish plants here referred to *S. villosa* (see entry for that name below). However, the morphology of the type specimen designated below is quite different from the type of *S. villosa* and much more resembles the lectotype of *S. chamaecyparissus*. The generalized locality provided in the protologue, “Hab. In Hispania” (Persoon, 1807), also does not allow to determine the precise provenance of the type material.

Santolina tomentosa Pers., Syn. Pl. 2: 406. 1807, nom. illeg., non Lam. 1779 ≡ *S. chamaecyparissus* subsp. *tomentosa* Arcang., Comp. Fl. Ital.: 363. 1882 (Art. 46.4 of the ICN) – **Neotype (designated here)**: no location/collection information (L 2D barcode L.3676273 [photo!]).

***Santolina valida*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No specimen collected before the publication of the name could be located (we searched in BM, K, LY, MPU, and P, where Jordan’s specimens are supposed to be conserved; Stafleu & Cowan, 1979). The illustration published in the protologue is original material, and we designate it as the lectotype. The lectotype illustration depicts a plant compatible with the type of *S. benthamiana*. Indeed, the leaf segments are very long, and the sterile stems are clearly more tomentose than the fertile stems. Moreover, it was described based on material from near Millas (Pyrénées-Orientales, France), which is within the range of *S. benthamiana* Tison & Foucault, 2014).

Santolina valida Jord. & Fourr., Icon. Fl. Eur. 2: 9. 1869 ≡ *Santolina chamaecyparissus* var. *incana* subvar. *valida* (Jord. & Fourr.) Rouy, Fl. France 8: 223. 1903 ≡ *Santolina chamaecyparissus* var. *valida* (Jord. & Fourr.) Guinea in Anales Inst. Bot. Cavanilles 27: 42. 1970 – **Lectotype (designated here)**: [illustration] “*Santolina valida* Jord. et Fourr.” in Jordan & Fourreau, Icon. Fl. Eur. 2: t. 224. 1869.

***Santolina villosa*.** — Carbajal & al. (2019) cited P barcode P00680429 in Tournefort’s herbarium as the “holotype” of *S. villosa*. However, this specimen is neither the holotype nor original material for this name, irrespective of a label attached on the sheet that claims it as “holotype de *Santolina villosa* Mill.” Miller cited Tournefort’s polynomial in the protologue, but the name *S. villosa* was not validated solely by this reference, such that Art. 7.8 does not apply (for a similar case, see *Bulbocodium serotinum* L. in Peruzzi & Jarvis, 2009). We searched for original material in BM and LINN, where Miller’s specimens are supposed to be conserved (Stafleu & Cowan, 1981), but we did not find any specimen that can be considered original material for this name. Of all the *Santolina* specimens from the Chelsea Garden conserved in BM, we did not find any labelled as either *S. villosa* or as one of the polynomials listed as synonyms in the protologue. Given the above, a neotype should

be designated. The name *S. villosa* was applied by Greuter (2008), Tison & al. (2014), and Tison & Foucault (2014) to plants from Spain and southern France that largely correspond to *S. ericoides* as delimited by Carbajal & al. (2019) and typified here. According to the protologue, *S. villosa* is a densely tomentose plant that grows naturally in Spain. In contrast, *S. ericoides* is described as slightly pubescent (Poiret, 1805; Carbajal & al., 2019). It appears that the misapplication of *S. villosa* is due to the fact that Willdenow (1803) published the illegitimate name *S. squarrosa*, citing *S. villosa* as a synonym. By referring to Miller’s name, he also cited one of the Latin polynomials listed by Miller (1768), i.e. “pedunculis unifloris, calycibus globosis, foliis quadrifariam dentatis tomentosis [peduncles one-flowered, calyces globose, leaves four-ways intended, and tomentose]”. Surprisingly, however, Willdenow changed, probably by mistake, “calycibus globosis [calyces globose]” into “calycibus glabris [calyces glabrous]”. The only plants in the *S. chamaecyparissus* complex that occur in Spain and correspond approximately to Willdenow’s “changed” description are those referred here and by Carbajal & al. (2019) to *S. ericoides*. However, in Spain there are also plants similar to *S. ericoides*, but with whitish or greyish leaves and stems, and densely pubescent involucre bracts. These plants agree well with the protologue of *S. villosa* and were provisionally referred to *S. chamaecyparissus* subsp. *tomentosa* by Carbajal & al. (2019), a name that instead applies to plants within the variability of *S. chamaecyparissus*. During the first OPTIMA Iter (Matthas & Valdés, 1991), several specimens of this *Santolina* were collected in Gor, Granada, Spain. We believe that this collection is an excellent choice for a neotype, given that it is widely distributed in European herbaria. The replicate in PAL-GR is designated as the neotype. It should be noted that, if treated at subspecies or varietal rank, the correct epithet for this taxon is “*squarrosa*”.

Santolina villosa Mill., Gard. Dict., ed. 8: *Santolina* no. 2. 1768 ≡ *Santolina squarrosa* Willd., Sp. Pl. 3: 1798. 1803, nom. illeg. (Art. 7.5), non L. 1756 ≡ *Santolina chamaecyparissus* var. *squarrosa* DC., Prodr. 6: 35. 1837 (Art. 46.4) ≡ *Santolina chamaecyparissus* subsp. *squarrosa* (DC.) Nyman, Consp. Fl. Eur.: 368. 1879 ≡ *Santolina chamaecyparissus* f. *squarrosa* (DC.) Fiori in Fiori & al., Fl. Italia 3: 270. 1903 – **Neotype (designated here)**: Spain, Granada, Gor, “Gor: Venta de Castín, Arroyo de Gor”, 20 Jun 1988, B. Valdés & al. It1080/88 (PAL-Gr barcode PAL-Gr 064650 [photo!]; isoneotypes: B n.v., CAT n.v., DCSR n.v., FI!, G n.v., NICE n.v., RNG n.v., SEV n.v.).

***Santolina villosissima*.** — This name was not listed as a synonym of any accepted name by Greuter (2008). No original material was located in BR, FI, P, and UPS (Stafleu & Cowan, 1983), and a neotype should be selected (Art. 9.8). In the protologue, “Mont Victoire”, located in Provence, France was cited as one of the localities for this species. The specimen LY barcode LY0340523 was collected from Montagne Saint Victoire, and its morphology is compatible with the protologue.

The specimen selected as the neotype is a woolly and whitish plant; the stems are short, as well as the leaves (<2 cm) and the leaf segments (<2 mm). This morphology and the provenance of the neotype agree with the type of *S. decumbens*.

Santolina villosissima Poir. in Lamarck, Encycl. 6: 505. 1805 ≡ *Santolina chamaecyparissus* var. *villosissima* (Poir.) DC., Prodr. 6: 35. 1838 – **Neotype (designated here)**: France, Provence-Alpes-Côte d’Azur, Montagne Sainte-Victoire, 29 Jun 1906, *J.-J. Paulet s.n.* (LY barcode LY0340523 [photo!]).

***Santolina virens*.** — The specimen BM barcode BM000909705 is conserved in Miller’s herbarium and its morphology fits well with the protologue, since it is a dark green plant with long and two-ways indented leaves. However, no original identification is given on the sheet, and, as such, it is not clear that Miller identified it as *S. virens*. Another specimen (BM barcode BM000909712) was collected in the Chelsea Garden in 1727, and also in this case, its morphology fits well with the protologue. However, it was assigned to a polynomial that does not correspond to any of those listed by Miller under *S. virens*. BM barcode BM000909651 was collected in 1727 in the Chelsea Garden and labelled by Miller, or by someone else who was working at the Garden, as “*Santolina foliis obscure virentibus; flore aureo [Santolina with dark green leaves; flower golden]*”, which matches one of the polynomials listed under *S. virens* by Miller (1768). However, the morphology of this specimen is in serious conflict with the protologue since *S. virens* is described as a plant showing two-ways indented leaves, while the specimen has entire and not indented leaves, instead resembling a member within the *S. rosmarinifolia* complex. Even if this latter specimen can be considered as original material, it cannot be selected for lectotypification under Art. 9.19(c).

Given the absence of suitable original material, we designate a neotype. According to Carbajal & al. (2019), *S. virens* is native to Spain only, where it occurs in the high valley of the Ebro river and in the middle and high valleys of the Duero river. Two specimens at P (barcodes P03277835 and P03315504) were collected in 1908 near Miranda de Ebro (Castile and León, Spain). These specimens fit well with Miller’s description of *S. virens* and with the range given by Carbajal & al. (2019). They are dark green and fully glabrous plants. The leaves are long and two-ways indented. The segments are very short and spaced-out. We designate the specimen P03277835 as the neotype. It should be noted that, if treated at subspecies rank, the correct epithet to be used for this taxon is “*viridis*”.

Santolina virens Mill., Gard. Dict., ed. 8: *Santolina* no. 4. 1768 ≡ *Santolina viridis* Willd., Sp. Pl. 3: 1798. 1803, nom. illeg. (Art. 52.1 and 52.2 of the ICN) ≡ *Santolina chamaecyparissus* subsp. *viridis* Rouy, Fl. France 8: 224. 1903 (Art. 46.4 of the ICN) ≡ *Santolina rosmarinifolia* subsp. *rosmarinifolia* var. *viridis* (Rouy) Guinea in Anales Inst. Bot. Cavanilles 27: 39. 1970 – **Neotype (designated here)**:

Spain, Castile and León, Miranda de Ebro, 29 Jun 1908, *H. Elías s.n.* (P barcode P03277835 [photo!]; isoneotype: P barcode P03315504 [photo!]).

■ AUTHOR CONTRIBUTIONS

AG (Ph.D. student) searched for original material, took contact with herbarium curators, and wrote the manuscript. GA (post-doc researcher) reviewed the versions of the manuscript. LP (associate professor) is the principal investigator of the “Progetto di Ricerca di Rilevante Interesse Nazionale” (PRIN) 2017JW4HZK. He took contact with L. Saez, R. Carbajal, and J.-M. Tison and reviewed advanced versions of the manuscript. — AG, <https://orcid.org/0000-0001-8263-6018>; GA, <https://orcid.org/0000-0001-5790-3516>; LP, <https://orcid.org/0000-0001-9008-273X>

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