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Mediterranean plant karyological data – 35

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Mediterranean plant karyological data – 35/1

Contribution to the karyological knowledge of some representatives of the family *Asteraceae* in the Pyrenean flora, III

T. Garnatje, I. Pérez-Lorenzo, J. Vallès, S. Siljak-Yakovlev

Abstract

General distribution, localities, chromosome numbers, ploidy levels, and selected previous chromosome counts are provided for eight taxa belonging to the *Asteraceae* family growing in the Pyrenees.

Keywords: *Anacyclus*, *Chondrilla*, *Cota*, chromosome number, distribution, *Crepis*, *Erigeron*, ploidy level, *Scorzoneroides*, *Sonchus*, *Urospermum*.

Introduction

Asteraceae or *Compositae* are one of the biggest plant families in the World and, consequently, are among those more studied from many different points of view. It is also highly species rich the Pyrenees, and various ongoing projects focus on them in this area. Chromosome numbers and ploidy levels are two basic karyological and cytogenetic characters, which are crucial for understanding the processes undergone by the species constituting the flora in any area.

This is the third paper published in this section, following Garnatje & al. (2023, 2024), aiming at increasing the current karyological datasets by providing additional information about chromosome numbers and ploidy levels of some taxa, some of them reported for the first time in populations of the Pyrenean area. To verify previous or complementary counts, we have consulted the Index to chromosome numbers in *Asteraceae* database (https://togodb.biosciencedbc.jp/db/index_chr_num_asteraceae#en, Semple & Watanabe 2023), and the Chromosome database of the flora of the Catalan Countries (https://sites.google.com/view/cromocat/home?authuser=0, Simon & al. 2023).

All plants studied have been collected in the Catalan Pyrenees (Iberian Peninsula), including their low-altitude foothills. Vouchers have been deposited in the herbarium BC, of the Botanical Institute of Barcelona. The information provided about their taxonomic status, general distribution area and ecology has been obtained in all cases from Plants of the World Online (POWO, https://powo.science.kew.org, accessed November 22, 20245) and Flora iberica (Devesa & al. 2014; Talavera & al. 2016; Benedí & al. 2019), and the Flora manual dels Països Catalans (Bolòs & al. 2005) has also been consulted.

2051. ***Anacyclus clavatus*** (Desf.) Pers. **—** 2*n* = 2x = 18 (Fig. 1A).

Hs: Catalonia, Alt Empordà, Avinyonet de Puigventós, surroundings of la Torre farmhouse, alt. 70 m, 42° 14' 37" N, 2° 54' 29" E, 8 Aug 2024, leg. *J. Vallès* (BC).

The native range of this annual species, growing primarily in the subtropical biome, is the Canary Islands (Lanzarote) and the Mediterranean region. It grows along roadsides between 0 and 1100 m a.s.l.

Although all studies on *A. clavatus* report a constant *n* = 9 or 2*n* = 18 chromosome number, two genetically distinct groups appear to exist, differing significantly in genome size. Based on the species' distribution, the current population falls within the so-called "GC1" group (Agudo & al. 2023), which is distributed across the central-northern Iberian Peninsula and is characterized by a genome size exceeding 2C = 10 pg DNA (Agudo & al. 2019; Pérez-Lorenzo in prep.). This count, agreeing with the previous ones, is the first one in the Pyrenean area (https://sites.google.com/view/cromocat/home?authuser=0), accessed November 15, 2025).

2052. ***Chondrilla juncea*** L. **—** 2*n* = 2x = 15 (Fig. 1B).

Hs: Catalonia, Alt Empordà, Avinyonet de Puigventós, roadside close to a field, near Mas Pau farmhouse, alt. 90 m, 42° 14' 14" N, 2° 54' 17" E, 16 Aug 2024, leg. *J. Vallès* (BC).

The native range of this species is Canary Islands, Europe to central Asia and Arabian Peninsula. It is a perennial and grows primarily in the temperate biome, along roadsides between 0 and 1250 m a.s.l.

Several chromosome numbers have been reported for this species, among which the current one (2*n* = 15), in some cases presented as 2*n* = 14 + 1B. Counts suggesting polyploidy (*n* = 15) have also been published, as well as diploid 2*n* = 14 (https://togodb.biosciencedbc.jp/db/index_chr_num_asteraceae#en, accessed November 18, 2025). Battaglia (1949) reports 2*n* = 15, indicating alterations in meiosis, with only univalents in diakinesis. The present count is the first one in the Pyrenean area (https://sites.google.com/view/cromocat/home?authuser=0), accessed November 15, 2025).

2053. ***Cota triumfetti*** (L.) J.Gay **—** 2*n* = 2x = 18 (Fig. 1D).

Hs: Catalonia, Ripollès, Feitús, alt. 1268 m, 42°21'05"N, 2°21'09"E, 7 Aug 2021, leg. *T. Garnatje (GR 746)* (BC).

The native range of this biennial or perennial species, growing primarily in the temperate biome, encompasses from Europe to Iran. In the Pyrenees, this species grows between 50 and 1800 m a.s.l.

The present chromosome number agrees with those previously published for this taxon, including one from the Iberian area (González & Elena-Rosselló 1986 and references therein, as *Anthemis triumfetti* DC.), but no counts were known to date from the Pyrenees (https://sites.google.com/view/cromocat/home, accessed November 18, 2025). The same authors also reported 2*n* = 18 for a variety (*A. triumfetti* var. *aligulata* (Losa) J.Sánchez), for which they also found 2*n* = 26 (27), suggesting a triploid level.

2054. *Crepis bursifolia* L. **—** 2*n* = 2x = 8 (Fig. 1C).

Hs: Catalonia, Alt Empordà, Avinyonet de Puigventós, surroundings of la Torre farmhouse, alt. 70 m, 42° 14' 37" N, 2° 54' 29" E, 8 Aug 2024, leg. *J. Vallès* (BC).

This taxon is distributed all along western Mediterranean including the Iberian Peninsula (https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:199744-1, accessed November 13, 2025), and North Africa, where its populations represent natural occurrences (López & al. 2013). In Catalonia, the species was collected for the first time by Sennen in 1917 (BC-Sennen 878361).

This chromosome number agrees with numerous previous counts from different areas (https://togodb.biosciencedbc.jp/db/index_chr_num_asteraceae#ja, accessed November 12, 2025), including the classical monograph of the genus *Crepis* by Babcock (1947). However, Berjano & al. (2014) reported two ploidy levels (2*n* = 2x = 8 and 2*n* = 4x = 16) in Moroccan populations. This is the first report of the chromosome number of this taxon in a Pyrenean area population (https://sites.google.com/view/cromocat/home, accessed November 12, 2025).

2055. *Erigeron acris* L. **—** 2*n* = 2x = 18 (Fig. 2A).

Hs: Catalonia, Ripollès, La Farga, Queralbs, alt. 1332 m, 42° 21' 06.3" N, 2° 10' 25.9" E, 15 Aug 2021, leg. *Iván Pérez-Lorenzo (IPL 408)* (BC).

The native range of this biennial or perennial species, which grows primarily in the temperate biome, is basically North America and Eurasia. It is found from 600 (occasionally less, until 100) to 1500 (occasionally more, up to 2200) m a.s.l.

Several counts (in some cases as *Erigeron acer* L.) previously recorded for this taxon agree with the present one, even if in some cases the number is indicated as 2*n* = ca. 18. A tetraploid 2*n* = 36 count has also been published. To date, no reports from the Pyrenean area were available (https://sites.google.com/view/cromocat/home, accessed November 15, 2025).

2056. *Scorzoneroides duboisii* (Sennen ex Widder) Greuter **—** 2*n* = 2x = 12 (Fig. 2B).

Hs: Catalonia, Ripollès, Bastiments, alt. 2371 m, 42° 25' 13" N, 2° 14' 57" E, 18 Aug 2023, leg. *J. de Montaigne*, *T. Garnatje (GR899bis)*, *O. Hidalgo & I. Pérez-Lorenzo* (BC).

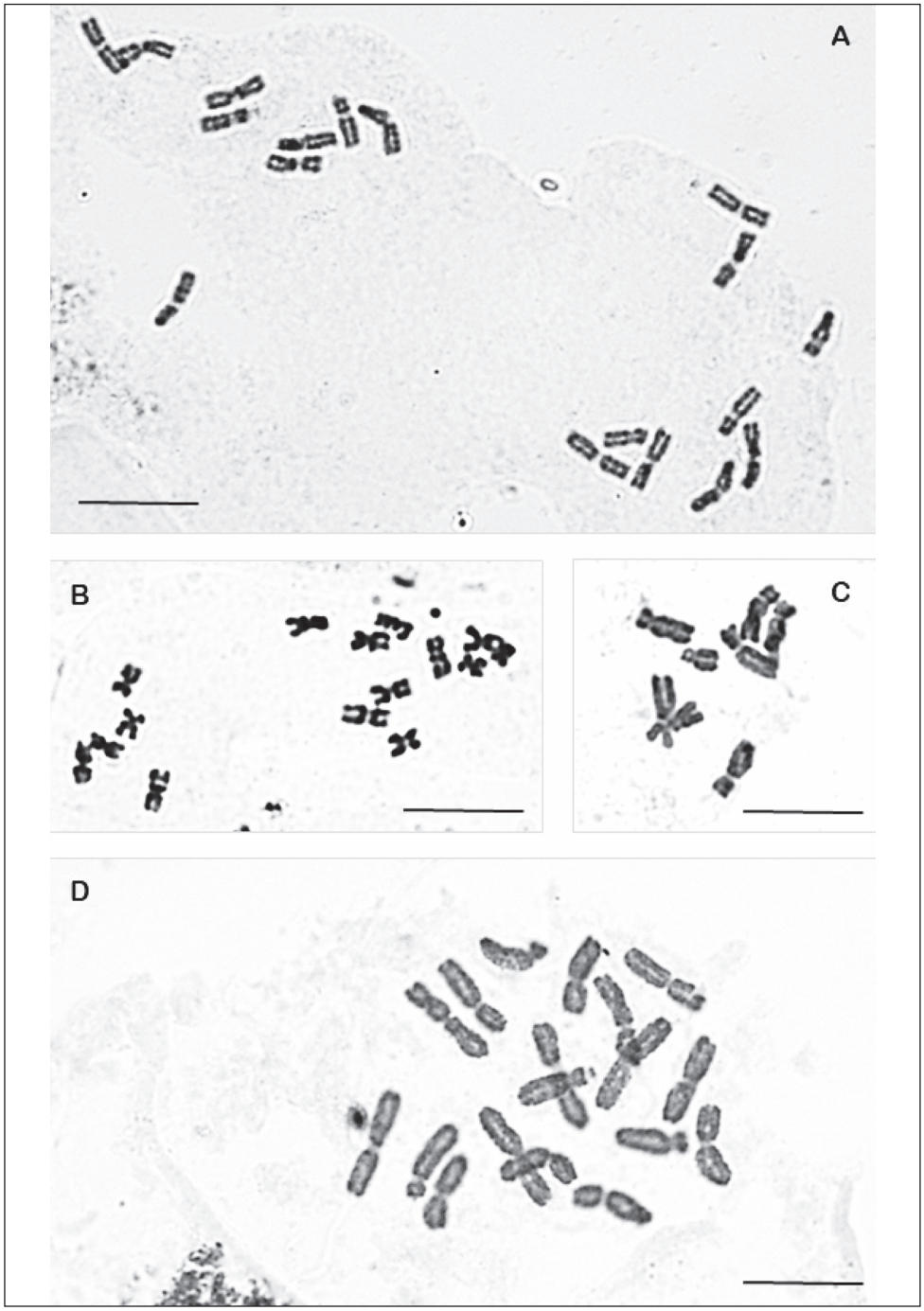

Fig. 1. Mitotic metaphase chromosome plates: **A**, *Anacyclus clavatus*, 2*n* = 18; **B**, *Chondrilla juncea*, 2*n* = 15; **C**, *Crepis bursifolia*, 2*n* = 8; **D**, *Cota triumfetti*, 2*n* = 18. – Scale bars = 10 μm.

The distribution area of this perennial herb, which grows primarily in the temperate biome, is limited to the Pyrenean (Andorra, France, Spain) and the Cantabrian (Spain) ranges.

The chromosome number here reported agrees with a few previous counts in this species (as *Leontodon duboisii* (Sennen ex Widder)). One of them is from a population from the same Catalan district as the present one, but located at much lower altitude, 1400 m a.s.l. (Izuzquiza & Nieto Feliner 1991).

2057. *Sonchus oleraceus* L. — 2*n* = 2x = 32 (Fig. 2C).

Hs: Catalonia, Ripollès, Setcases, camí de Tregurà, alt. 1267 m, 42° 22' 29" N, 2° 18' 00" E , 13 Aug 2023, leg. *T. Garnatje (GR 881) & J. Luque (BC)*.

The native range of this annual or biennial species, growing primarily in the temperate biome, is basically Europe and northern and central Africa, and the Mediterranean basin, being introduced in many Asian, African, American and Oceanian areas. It grows between 0 and 1500 m, often in cultivated fields and ruderal grasslands.

Numerous counts on this taxon offer a variety of chromosome numbers (https://sites.google.com/view/cromocat/home, accessed November 16, 2025). Some of them (*n* = 16 or 2*n* = 32) are coincidental with the present one and suggest a basic chromosome number of x = 8 or, since no *n* = 8 or 2*n* = 16 counts are recorded, x = 16, the latter probably fruit of an old event of polyploidy. The recorded 2*n* = 64 would indicate a higher polyploid cytotype. Conversely, some available counts (*n* = 9, *n* = 18, 2*n* = 18, 2*n* = 36) would indicate x = 9 as a basic chromosome number, with *n* = 10 suggesting x = 10. Further research with detailed karyotype analysis, completed with genome size data, would shed light on this diversity of chromosome numbers attributed to this species. The present count is the first one in the Pyrenean area (https://sites.google.com/view/cromocat/home, accessed November 16, 2025).

2058. *Urospermum dalechampii* (L.) Scop. ex F.W.Schmidt — 2*n* = 2x = 14 (Fig. 2D).

Hs: Catalonia Alt Empordà, Avinyonet de Puigventós, roadsides near the hermitage of Santa Eugènia, alt. 62 m, 42° 14' 23" N, 2° 55' 02" E, 8 Aug 2024, leg. *J. Vallès* (BC).

The native range of this perennial herbaceous species, growing primarily in the subtropical biome, is western and central Mediterranean region. It grows from 0 to 1100 m a.s.l., particularly in mesoxerophilous pastures, wastelands, roadsides and ruderal places.

Our count is coincidental with those already published for this taxon (Larsen 1956; Pellicer & al. 2022, and references therein). The same chromosome number (*n* = 7) was counted in a population of the same low altitude Pyrenean foothill Catalan district (Luque & al. 1984), located at 6 km from the present one.

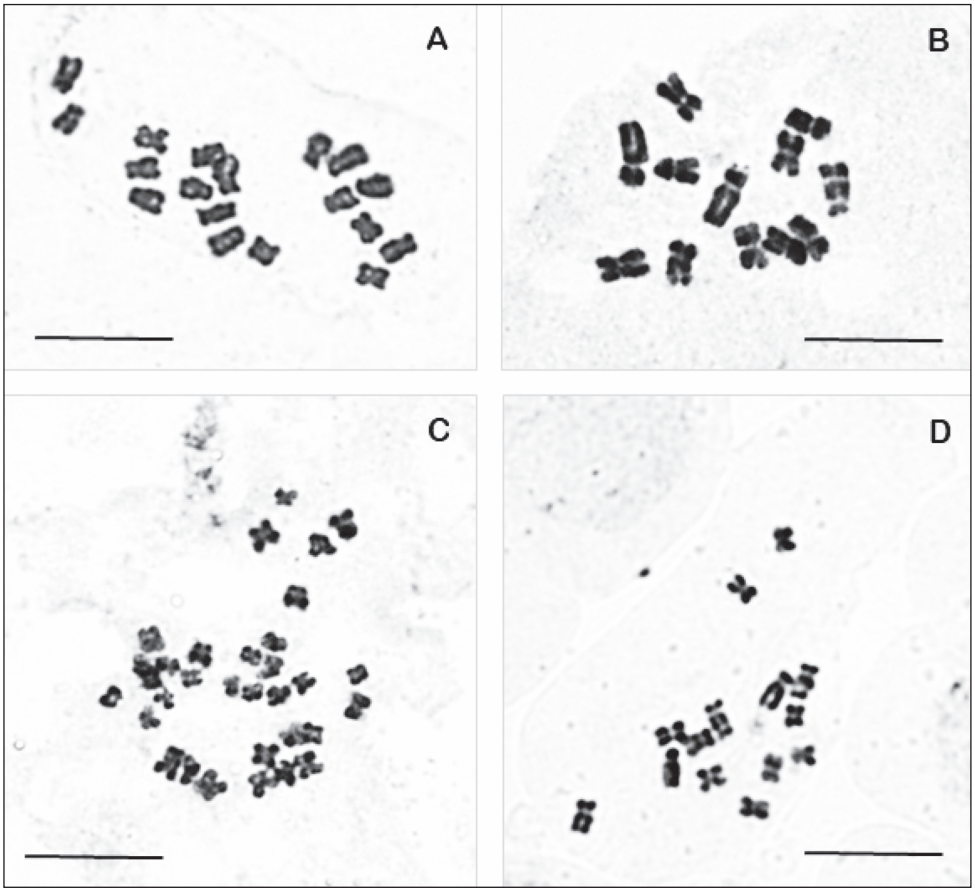

Fig. 2. Mitotic metaphase chromosome plates: **A**, *Erigeron acris*, 2*n* = 18; **B**, *Scorzoneroides duboisii*, 2*n* = 12; **C**, *Sonchus oleraceus*, 2*n* = 32; **D**, *Urospermum dalechampii*, 2*n* = 14. – Scale bars = 10 µm.

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Mediterranean plant karyological data – 35/2

Chromosome numbers and ploidy levels in selected *Asteraceae* from the Western Balkans, part I

S. Siljak-Yakovlev, F. Pustahija, N. Takvorian, S. Le Prieur & E. Muratović

Abstract
Chromosome numbers, ploidy levels and metaphase plates are reported for seven *Asteraceae* (*Compositae*) species from Bosnia and Herzegovina (*Arctium lappa*, *Buphthalmum salicifolium*, *Cirsium eriophorum*, *Cota tinctoria*, *Hieracium sabandum*, *Lapsana communis*, *Tripleurospermum inodorum*) and one species from Croatia (*Urospermum picroides*). Detailed localities (including GPS coordinates) of the collected material are also provided, along with a general overview of the distribution of the species studied.

Keywords: Karyology, *Arctium*, *Buphthalmum*, *Cirsium*, *Cota*, *Hieracium*, *Lapsana*, *Tripleurospermum*, *Urospermum*, Bosnia and Herzegovina, Croatia.

Introduction

In an upcoming project focused on the *Asteraceae* of the Western Balkans, one of the initial steps will be to determine the chromosome number, ploidy level, and genome size for as many species as possible. These essential biological characteristics are crucial for conducting a thorough study of the regional flora.

The chromosome numbers identified in this study are compared with those previously reported in the relevant literature.

To verify the previously reported chromosome number for the studied species, we consulted the existing chromosome counts databases: Rice & al. 2015), which includes the Index to chromosome numbers in *Asteraceae* database (https://togodb.biosciencedbc.jp/db/index_chr_num_asteraceae#en, Semple & Watanabe 2023); Fedorov (1969); IPCN by Goldblatt & Johnson (1979).

The information on the taxonomic status and general distribution area of the studied species has been sourced from Plants of the World Online (POWO, https://powo.science.kew.org). We checked all these databases on November 2025. The vouchers for all collected species have been deposited in the herbarium of the Laboratory for research and protection of endemic resources at the Faculty of Sciences, University of Sarajevo (HOBY_ GeSDaBaF).

The results obtained from the studied species, along with the data on their genome sizes currently being collected, will enhance the existing database on Balkan flora: Genome Size Database of Balkan Flora (GeSDaBaF) (http://www.pmf.unsa.ba/gesdabaf).

2059. ***Arctium lappa*** L. — 2*n* = 36 (Fig. 1A).

BH: Mt. Igman, limestones, 43° 44' 22" N, 18° 16' 30" E, 1256 m a.s.l., 13 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Arctium lappa L. is a perennial plant that grows primarily in the temperate biome, with a native range in Temperate Eurasia (POWO 2025).

A previously reported chromosome number for the species was 2*n* = 18 (Astanova 1989) and 2*n* = 36 (Probatova & al. 2006; Ankova & Zykova 2017; Bhatt & al. 2025), where the tetraploid cytotype (2*n* = 36) is the most common and which we also found in the population of Mt. Igman from Bosnia.

2060. ***Buphthalmum salicifolium*** L. — 2*n* = 20 (Fig. 1B).

BH: Mt. Igman, limestones, 43° 45' 55" N, 18° 14' 54" E, 1209 m a.s.l., 13 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Buphthalmum salicifolium L. is a perennial plant growing primarily in the temperate biome, with a native range in Central & South Central Europe (POWO 2025).

The most frequent chromosome number reported for the species was 2*n* = 20 (Druskovic & Lovka 1995; Temsch & al. 2010). While Bechi & al. (1996) reported a chromosome number of 2*n* = 22. Our study found the chromosome count to be 2*n* = 20.

2061. ***Cirsium eriophorum*** (L.) Scop. — 2*n* = 34 (Fig. 1C).

BH: Mt. Trebević, limestones, 43° 47' 45" N, 18° 30' 36" E, 1155 m a.s.l., 12 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Cirsium eriophorum (L.) Scop. is a perennial plant that primarily grows in the temperate biome, with a native range extending from Europe to Turkey (POWO 2025).

The chromosome count observed in this study, 2*n* = 34, aligns with existing literature (Bures & al. 2004; Bennet & Leitch 2011).

2062. ***Cota tinctoria*** (L.) J. Gay — 2*n* = 36 (Fig. 1D).
(Syn. *Anthemis tinctoria* L. 1753)

BH: Dariva, Sarajevo, limestones, 43° 51' 31" N, 18° 26' 48" E, 574 m a.s.l., 27 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Cota tinctoria (L.) J. Gay is a biennial or perennial plant that grows primarily in the temperate biome. It is native to Europe, the Mediterranean, Western Asia, and naturalised in scattered locations in North America (POWO 2025).

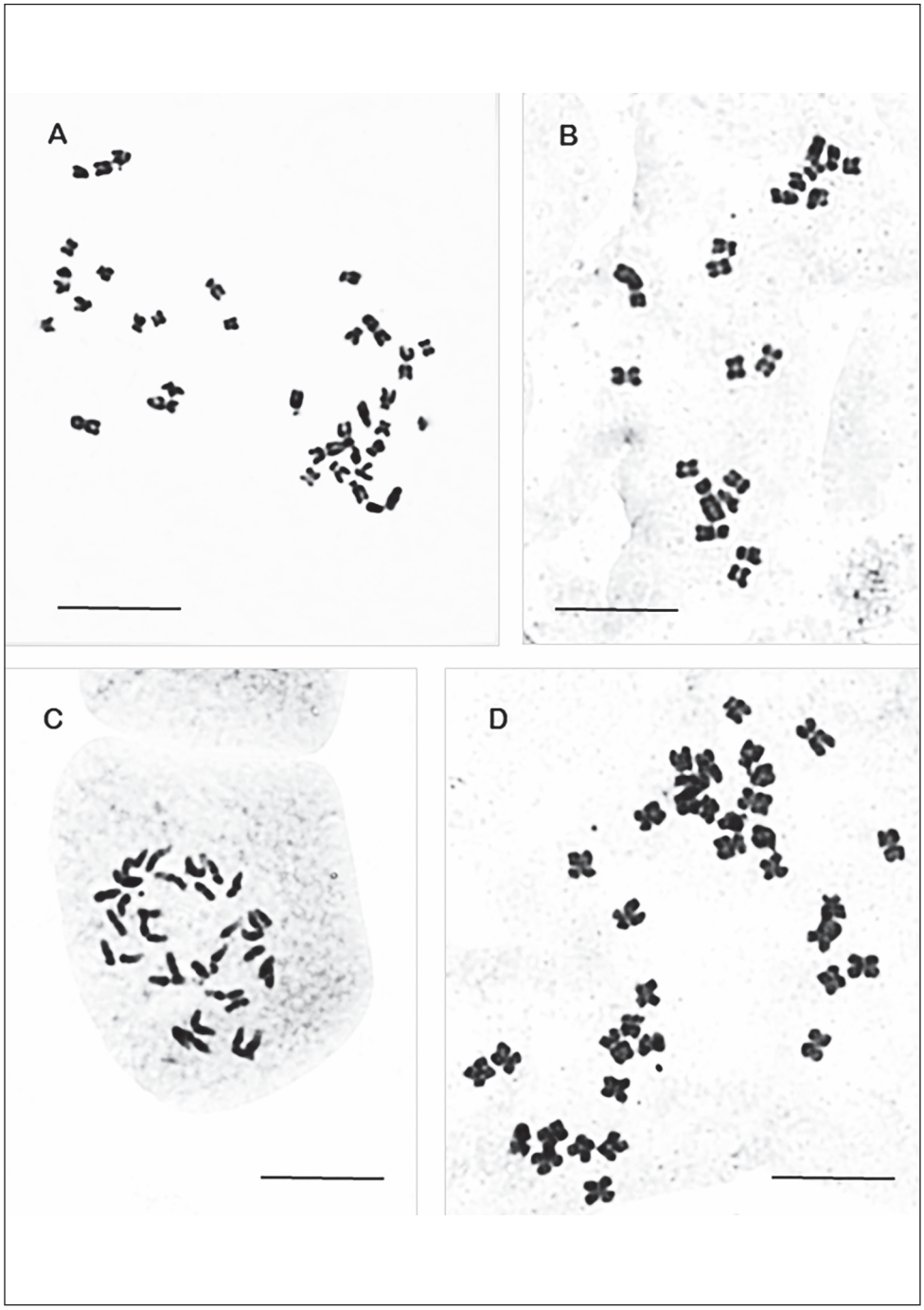

Fig. 1. Mitotic metaphase chromosome plates: **A**, *Arctium lappa*, 2*n* = 36; **B**, *Buphthalmum salicifolium*, 2*n* = 20; **C**, *Cirsium eriophorum*, 2*n* = 34; **D**, *Cota tinctoria*, 2*n* = 36. – Scale bars = 10 μm.

The tetraploid chromosome number 2*n* = 36, obtained in this study, is the first report on the tetraploid level for this species. Previous reports indicated only diploid chromosome number 2*n* = 18 (Blanché & al. 1985; Inceer & Hayirlioglu-Ayaz 2007).

2063. *Hieracium sabaudum* L. — 2*n* = 3x = 27 (Fig. 2A).

BH: Lapišnica, Sarajevo, limestones, 43° 51' 10" N, 18° 27' 47" E, 609 m a.s.l., 27 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Hieracium sabaudum L. is a perennial plant that mainly grows in the temperate biome, with a native range from Europe to Turkey (POWO 2025).

Three chromosome numbers corresponding to three ploidy levels, 2*n* = 18, 27, and 36 have been reported for this species (Hrušovská-Osuská 1988; Chrtek 2004; Szelag & Vladimirov 2005; respectively). In our population, we observed the triploid chromosome number 2*n* = 3x = 27.

2064. *Lapsana communis* L. — 2*n* = 14 (Fig. 2B).

BH: Lapišnica, Sarajevo, limestones, 43° 51' 10" N, 18° 27' 47" E, 609 m a.s.l., 27 Sept2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Lapsana communis L. is an annual plant that grows primarily in the temperate biome, with a native range from Macaronesia, Europe to Siberia and Iran (POWO 2025).

The most frequently reported chromosome number for this species was 2*n* = 14 (Kiehn & al. 1991; Gemeinholzer & Faustmann 2005; Garnatje & al. 2024), but 2*n* = 16 has also been reported (Pak & Bremer 1995; Albers & Pröbsting 1998; Gemeinholzer & Faustmann 2005). Given that B chromosomes have been reported (Lövkvist & Hultgård 1999), the 2*n* = 16 could be an erroneous count involving 2 B-chromosomes.

2065. *Tripleurospermum inodorum* (L.) Sch. Bip. — 2*n* = 36 (Fig. 2C).

BH: Mt. Trebević, limestones, 43° 50' 36" N, 18° 25' 28" E, 869 m a.s.l., 12 Sept 2023, leg. *E. Muratovic & F. Pustahija* (HOBY_ GeSDaBaF).

Tripleurospermum inodorum (L.) Sch. Bip. is an annual or biennial plant that grows primarily in the temperate biome, with a native range from Europe to Siberia and Xinjiang (POWO 2025).

Two chromosome numbers have been reported: diploids with a chromosome number of 2*n* = 18 (Carr & al. 1999; Certner & al. 2019) and tetraploids with a chromosome number of 2*n* = 4x = 36 (Arora & Madhusoodana 1981; Samatadze & al. 1998; Inceer & al. 2018; Certner & al. 2019). In our population, we found only tetraploid individuals.

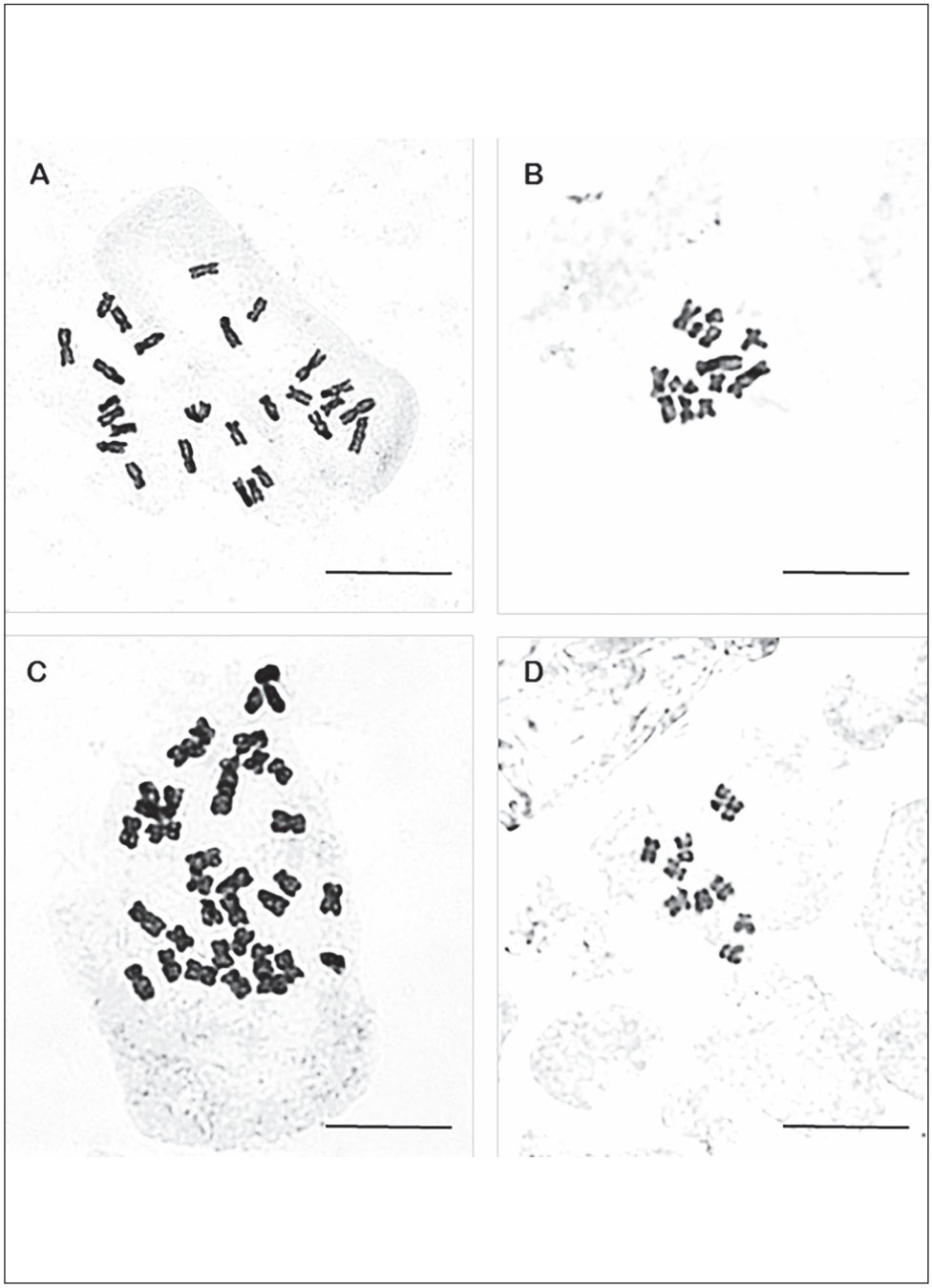

Fig. 2. Mitotic metaphase chromosome plates: **A**, *Hieracium sabaudum*, 2*n* = 27; **B**, *Lapsana communis*, 2*n* = 14; **C**, *Tripleurospermum inodorum*, 2*n* = 36; **D**, *Urospermum picroide*s, 2*n* = 10. – Scale bars = 10 µm.

2066. ***Urospermum picroides*** (L.) F. W. Schmidt — $2n = 10$ (Fig. 2D).

Cro: Baćina, near Gradac, limestones, 43° 04' 55" N, 17° 22' 00" E, 58 m a.s.l., 16 May 2025, leg. *S. Siljak-Yakovlev & M. Maksimović* (HOBY_ GeSDaBaF).

Urospermum picroides (L.) F. W. Schmidt is an annual plant that grows primarily in the subtropical biome, with a native range from Macaronesia, the Mediterranean to Iran and the Arabian Peninsula (POWO 2025).

The chromosome number $2n = 10$ have been reported several times (Vogt & Aparicio 1999; Baltisberger & Widmer 2006; Pellicer & al. 2022). We confirm the same chromosome number ($2n = 10$), which we also previously observed in two other populations from Croatia (Vallès & al. 2017).

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