

# Chromosome numbers for the Italian flora: 10

Romeo Di Pietro<sup>1</sup>, Antonio L. Conte<sup>2</sup>, Paola Fortini<sup>2</sup>,  
Gianni D'Amato<sup>3†</sup>, Giovanni Astuti<sup>4</sup>

**1** Dipartimento PDTA, Università di Roma Sapienza, 00196 Roma, Italy **2** Dipartimento di Bioscienze e Territorio, Università del Molise, 86090 Pesche (Isernia), Italy **3** Dipartimento di Biologia ambientale, Università Sapienza di Roma, 00185 Roma, Italy **4** Dipartimento di Biologia, Università di Pisa, Via Derna 1, 56126 Pisa, Italy

Corresponding author: Giovanni Astuti ([gastuti@biologia.unipi.it](mailto:gastuti@biologia.unipi.it))

---

Academic editor: L. Peruzzi | Received 9 December 2020 | Accepted 11 December 2020 | Published 17 December 2020

---

**Citation:** Di Pietro R, Conte AL, Fortini P, D'Amato G, Astuti G (2020) Chromosome numbers for the Italian flora: 10. Italian Botanist 10: 113–122. <https://doi.org/10.3897/italianbotanist.10.61847>

---

## Abstract

In this contribution, new chromosome data regarding two taxonomically critical genera of the Italian flora, namely *Plantago* and *Sesleria*, are presented. All the specimens analysed in this paper were collected in the Italian territory and include three chromosome counts for *Plantago* (*P. albicans*, *P. crassifolia*, and *P. subulata*) and two counts for *Sesleria* (*S. caerulea* and *S. nitida*).

## Keywords

Cytogeography, cytotaxonomy, chromosome number instability, *Plantago*, *Sesleria*

## How to contribute

Texts concerning new chromosome data should be submitted electronically to Giovanni Astuti ([gastuti@biologia.unipi.it](mailto:gastuti@biologia.unipi.it)), including indications on voucher specimens and methods used.

## Chromosome counts

### *Plantago albicans* L. (Plantaginaceae)

**Chromosome number.**  $2n = 20$  (Fig. 1)

**Voucher specimen.** ITALY. Basilicata. Madonna delle Grazie (Pisticci, Matera) (WGS84: 40.374528N, 16.557667E), stenomediterranean dry grasslands developed on quaternary marine sands, 150 m, 28 May 2001, R. Di Pietro (HFLA).

**Method.** Squash preparations were made on root tips obtained from living plants. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

**Observations.** In the last ten years, narrow leaved plantains have been the subject of accurate taxonomic and nomenclatural revisions which led to numerous changes in their classification (Di Pietro et al. 2013; Di Pietro and Iamónico 2014a, b; Hassemmer et al. 2017; Iamónico et al. 2017). On the contrary, the karyological data available at present for the Italian territory are few. *Plantago albicans* is a steno-Mediterranean species which in Italy occurs in the following administrative regions: Puglia, Basilicata, Calabria, Sicilia, Sardegna, and Liguria (Bartolucci et al. 2018). Fedorov (1969) listed a number of chromosome counts from north Africa:  $2n = 10, 12, 20, 24$  and  $30$ . Badr and El-Kholy (1987), found solely a chromosome number of  $2n = 30+3B$  for Egyptian populations, whereas Puech (1987, 1988) found different chromosomal numbers between Tunisian populations from the north ( $2n = 20$ ) and south ( $2n = 10$ ) of the country, and Vogt and Oberprieler in Marhold (2009) reported  $2n = 10$  for plants from Morocco. Furthermore, Maamri et al. (2016), for Algeria, found a different chromosome number associated to different altitudinal belts. In fact, they recorded  $2n = 10$  and  $2n = 20$  from *P. albicans* populations collected at medium-altitude and high-altitude sites, respectively. In addition, they found various intermediate chromosome numbers ( $2n = 6, 8, 9, 12, 14, 15, 17, 18$ ) interpreted as aneuploid cytotypes. As far as Europe is concerned, Runemark (1967) reported  $2n = 30$  for Aegean populations. In Italy, hexaploid karyotypes ( $2n = 30$ ) were reported by Bartolo et al. (1978) and Brullo et al. (1985) for Sicilian populations and by Peruzzi and Cesca (2002) for Calabrian populations. In our study, we have analysed 13 plates and we have always counted  $2n = 20$  chromosomes. This result is interesting as this number has never been reported so far for Italian populations, whereas it was already found in populations from Spain (Lorenzo-Andreu 1951) and France (Rahn 1957). Although *P. albicans* exhibits a high karyological and phenotypic variability, it may be possible to highlight a geographical separation between a south-eastern area (North Africa, Greece, Sicily, and southern Calabria) with  $2n = 30$  chromosomes and a south-western area (continental Italy, Portugal, Spain, and France) with  $2n = 20$  chromosomes. Puech et al. (1998) pointed out that the two groups are also differentiated from a functional point of view due to the fact that the  $2n = 30$  cytotype exhibits a



**Figure 1.** *Plantago albicans* L. from Madonna delle Grazie (Pisticci, Matera),  $2n = 20$ . Scale bar: 10 μm.

much shorter seed germination period than the  $2n = 20$  one. According to the same author, this feature could represent an evolutionary advantage in places where the wet season is usually very short.

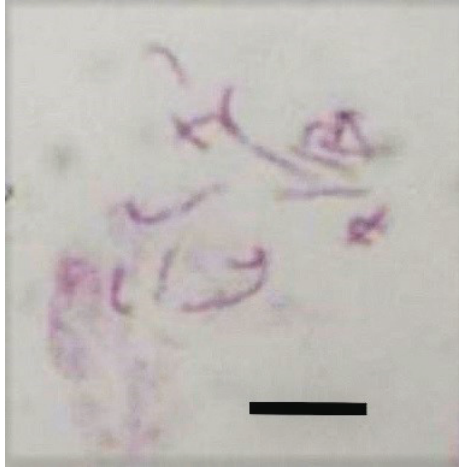
### *Plantago crassifolia* Forssk. (Plantaginaceae)

**Chromosome number.**  $2n = 20$  (Fig. 2)

**Voucher specimen.** ITALY. Puglia. Saline di Punta della Contessa (Brindisi) (WGS84: 40.615361N, 18.024000E), temporarily inundated sands characterizing retrodunal areas (*Schoeno nigricantis-Plantaginetum crassifoliae* Br.-Bl. 1931), 1 m, 20 May 2008, R. Di Pietro (HFLA).

**Method.** Squash preparations were made on root tips obtained from living plants. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsin for 7–8 minutes.

**Observations.** *Plantago crassifolia* is a Mediterranean species which occurs throughout southern Italy with the exception of Campania, and in Emilia-Romagna, Veneto, and Friuli-Venezia Giulia (Bartolucci et al. 2018). In the studied population we found chromosome number  $2n = 20$ , which confirms the karyological literature for Sicily (Brullo et al. 1985) and for Puglia itself on the Gargano Promontory (Snogerup 1985), Porto Cesareo (Peruzzi 2003) and for unspecified localities (Tornadore and Marcucci 1988). The number  $2n = 20$  was also found by Böcher et al. (1955) from southern France and confirmed by Chater and Cartier (1976).



**Figure 2.** *Plantago crassifolia* Forssk. from Saline di Punta della Contessa (San Godenzo, Brindisi),  $2n = 20$ . Scale bar: 10  $\mu\text{m}$ .



**Figure 3.** *Plantago subulata* L. from Isola di San Domino (Isole Tremiti, Foggia),  $2n = 12$ . Scale bar: 10  $\mu\text{m}$ .

### *Plantago subulata* L. (Plantaginaceae)

**Chromosome number.**  $2n = 12$  (Figs 3, 4)

**Voucher specimens. ITALY. Puglia.** Torre dell'Orso (Melendugno, Lecce) (WGS84: 40.268722N, 18.439611E), rocky coastal areas on limestone, 1 m a.s.l., 20 May 2008, *R. Di Pietro* (HFLA); Isola di San Domino (Isole Tremiti, Foggia) (WGS84: 42.120972N, 15.495389E), rocky coastal side 12 May 2002, *M. Cutini* (HFLA).

**Method.** Squash preparations were made on root tips obtained from living plants. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy



**Figure 4.** *Plantago subulata* L. from Torre dell'Orso (Melendugno, Lecce),  $2n = 12$ . Scale bar: 10  $\mu$ m.

fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsin for 7–8 minutes.

**Observations.** Prior to Hassemer's review (2018), the following narrow-leaved plantains were considered to occur in Puglia: *Plantago grovesii* Brullo (a local Apulian endemic taxon whose distribution area is restricted to a narrow strip of rocky Adriatic coast of the southern Salento Peninsula from Torre dell'Orso to Otranto), *P. holosteum* Scop. subsp. *holosteum* (submontane and montane belt of Mount Gargano), and *P. holosteum* Scop. subsp. *scopulorum* (Degen) H-ic' restricted to the Tremiti Archipelago. In his recent revision, Hassemer (2018) synonymised all these species, together with other southern European narrow-leaved plantains occurring in Italy, such as *P. insularis* Gren. & Godr. and *P. humilis* Guss., to *P. subulata* L. and this classification was also followed in Bartolucci et al. (2018). From a karyological point of view, however, the literature referring to *P. subulata* s.l. is very variable. If we consider only the samples referring to *P. subulata* L. s.str., these show a chromosome number of  $2n = 2x = 12$  (Contandriopoulos 1962). On the other hand, samples from Sardinia (= *P. insularis*), Sicily (= *P. humilis*) and North Africa (= *P. subulata* subsp. *atlantis* (Emb. & Maire) Greuter & Burdet) show  $2n = 4x = 24$  chromosomes (Contandriopoulos 1962; Corrias 1980). Currently, the most relevant hypothesis (Contandriopoulos 1962; Brullo et al. 1985) consider the tetraploid taxa as derived from a diploid *P. subulata*. In our karyological investigation, the Apulian specimens of *P. subulata* analysed (formerly attributed to *P. grovesii* and *P. holosteum* subsp. *scopulorum*) were quite similar and both provided a chromosome number  $2n = 12$ . However, the three aforementioned taxa occurring in Puglia seem to be morphologically quite dissimilar from one another (personal observations), besides being clearly separated geographically. For this reason, further investigations are necessary to clarify their taxonomic status.



**Figure 5.** *Sesleria caerulea* (L.) Ard. from Bosco delle Tagliate (Capo di Ponte, Brescia),  $2n = 28$ . Scale bar: 10  $\mu\text{m}$ .

### *Sesleria caerulea* (L.) Ard. (Poaceae)

**Chromosome number.**  $2n = 28$  (Fig. 5)

**Voucher specimen.** **ITALY. Lombardia.** Val Camonica, Bosco delle Tagliate, Pescarzo (Capo di Ponte, Brescia) (WGS84: 46.032639N, 10.318400E), undergrowth of *Ostrya carpinifolia* woods 25 October 2005, R. Di Pietro, G. Ciaschetti, S. Armiraglio, M. Caccianiga, E. Bona (HFLA); **Trentino-Alto Adige.** Mezzolombardo (Trento) (WGS84: 46.219833N, 11.083031E), chasmophytic vegetation on limestone cliffs in the hilly belt, 15 March 2006, R. Di Pietro & P. Fortini (HFLA).

**Method.** Squash preparations were made on root tips obtained from living plants. Root tips were pre-treated with 8-hydroxyquinoline 0.002M for 24 hours at 4 °C temperature and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C for 7–8 minutes, the tips were stained in leuco-basic fuchsin for 2–3 hours. Subsequently an enzymatic treatment of approximately 10–20 minutes with 10% pectinase solution and powdered cellulase in 5% solution was carried out.



**Figure 6.** *Sesleria nitida* Ten. from Pian de Valli (Vazia, Rieti),  $2n = 28$ . Scale bar: 10  $\mu$ m.

**Observations.** The genus *Sesleria* in Italy has been the object of an accurate taxonomic-nomenclatural revision (Brullo and Giusso Del Galdo 2006; Foggi et al. 2007; Di Pietro et al. 2013, 2015; Alonso et al. 2015; Di Pietro et al. 2017). It is well-known that in *Sesleria*, the ploidy level has a great discriminatory power for taxonomic classifications (Ujhelyi and Felföldy 1948; Strgar 1979; Di Pietro et al. 2005; Trombetta et al. 2005; Di Pietro 2007; Lazarević et al. 2015). *Sesleria caerulea* (= *S. varia* (Jacq.) Wettst.; *S. albicans* Kit ex Schult) is genotype of *Sesleria* (Foggi et al. 2001). In Italy, this species is widespread throughout the Alps and pre-Alps; it occurs also in a few relic sites in the western side of the northern Apennines. From the karyological point of view there are numerous karyological data available for this species published especially in eastern Europe (Májovský 1976; Lysák et al. 1997; Lysák and Doležel 1998; Petrova 2000; Budzáková et al. 2014), all reporting  $2n = 4x = 28$  chromosomes. Recently, Lazarević et al. (2015) found octoploid individuals in two *S. caerulea* populations from the Julian Alps. This is the first count for Italy.

### *Sesleria nitida* Ten. (Poaceae)

**Chromosome number.**  $2n = 28$  (Fig. 6)

**Voucher specimen.** ITALY. Lazio. Monte Terminillo, Pian de Valli (Vazia, Rieti) (WGS84: 42.453639N, 12.987333E), dry grasslands on rocky limestone slopes, 25 June 2003, R. Di Pietro, A. Granati (HFLA).

**Method.** Squash preparations were made on root tips obtained from living plants. Root tips were pre-treated with 8-hydroxyquinoline 0.002M for 24 hours at 4 °C

temperature and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C for 7–8 minutes, the tips were stained in leuco-basic fuchsine for 2–3 hours. Subsequently an enzymatic treatment of approximately 10–20 minutes with 10% pectinase in 10% solution, and powdered cellulase in 5% solution was carried out.

**Observations.** *Sesleria nitida* Ten. is a species endemic to the central and southern Apennines and Sicily. Our chromosome count confirms what was already reported for this species by Ujhelyi (1960) and by Trombetta et al. (2005).

R. Di Pietro, A.L. Conte, P. Fortini, G. D'Amato

## Acknowledgements

RDP, AC, PF wish to thank Alberto Bracaglia for his contribute in the laboratory work.

## References

- Alonso A, Acedo C, Di Pietro R, Iamónico D, Llamas F (2015) Typification of some names in the genus *Sesleria* (Poaceae). *Phytotaxa* 253(3): 191–200. <https://doi.org/10.11646/phytotaxa.253.3.2>
- Badr A, El-Kholy MA (1987) Chromosomal studies in the Egyptian flora. 2. Karyotype studies in the genus *Plantago* L. *Cytologia* 52(4): 725–731. <https://doi.org/10.1508/cytologia.52.725>
- Bartolo G, Brullo S, Pavone P (1978) Numeri cromosomici per la flora italiana: 484–493. *Informatore Botanico Italiano* 10(2): 267–277.
- Bartolucci F, Peruzzi L, Galasso G, Albano A, Alessandrini A, Ardenghi NMG, Astuti G, Bacchetta G, Ballelli S, Banfi E, Barberis G, Bernardo L, Bouvet D, Bovio M, Cecchi L, Di Pietro R, Domina G, Fascetti S, Fenu G, Festi F, Foggi B, Gallo L, Gottschlich G, Gubellini L, Iamónico D, Iberite M, Jiménez-Mejías P, Lattanzi E, Marchetti D, Martinetto E, Masin RR, Medagli P, Passalacqua NG, Peccenini S, Pennesi R, Pierini B, Poldini L, Prosser F, Raimondo FM, Roma-Marzio F, Rosati L, Santangelo A, Scoppola A, Scortegagna S, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhalm T, Conti F (2018) An updated checklist of the vascular flora native to Italy. *Plant Biosystems* 152(2): 179–303. <https://doi.org/10.1080/11263504.2017.1419996>
- Böcher T, Larsen K, Rahn K (1955) Experimental and cytological studies on plant species III. *Hereditas* 41(3–4): 423–453. <https://doi.org/10.1111/j.1601-5223.1955.tb03003.x>
- Brullo S, Giusso Del Galdo G (2006) Taxonomic remarks on *Sesleria nitida* Ten. (*Poaceae*), an orophyte endemic to Sicily and the central-southern Apennines. *Plant Biosystems* 140(1): 43–49. <https://doi.org/10.1080/11263500500519911>
- Brullo S, Pavone P, Terrasi MC (1985) Considerazioni carilogiche sul genere *Plantago* in Sicilia. *Candollea* 40: 217–230.
- Budzáková M, Hodálová I, Mereda P, Somlyay L, Bisbing SM, Šibík J (2014) Karyological, morphological and ecological differentiation of *Sesleria caerulea* and *S. tatrae* in the Western Carpathians and adjacent regions. *Preslia* 86: 245–277.



- Chater AO, Cartier D (1976) *Plantago crassifolia*. In: Tutin TG, Heywood VH, Burges NA, Valentine DH (Eds) Flora europaea 4. Cambridge University Press, Cambridge, 40–41.
- Contandriopoulos J (1962) Recherches sur la flore endémique de la Corse et sur ses origines. Annales de la Faculté des Sciences de Marseille 32: 1–354.
- Corrias B (1980) Numeri cromosomici per la flora italiana: 696–700. Informatore Botanico Italiano 12(2): 121–123.
- Di Pietro R (2007) Taxonomical features of *Sesleria calabrica* stat. nov. (*Poaceae*), a neglected species from southern Italy. Folia Geobotanica 42: 289–313. <https://doi.org/10.1007/BF02806468>
- Di Pietro R, D'Amato G, Trombetta B (2003) Karyology and distribution of *Sesleria tenuifolia* complex (*Poaceae*) in the Italian Peninsula. Nordic Journal of Botany 23(5): 615–624. <https://doi.org/10.1111/j.1756-1051.2003.tb00442.x>
- Di Pietro R, Iamónico D (2014a) Neotypification of the name *Plantago alpina* (*Plantaginaceae*). Taxon 63(6): 1347–1349. <https://doi.org/10.12705/636.5>
- Di Pietro R, Iamónico D (2014b) Proposal to reject the name *Plantago recurvata* (*Plantaginaceae*). Taxon 63(6): 1380–1381. <https://doi.org/10.12705/636.28>
- Di Pietro R, Iamónico D, Soldano A (2013) Proposal to conserve the name *Plantago serpentina* against *P. strictissima*. Taxon 61(6): 10–12.
- Di Pietro R, Kuzmanović N, Iamónico D, Lakušić D (2017) Nomenclatural and taxonomic notes on *Sesleria* sect. *Argenteae* (*Poaceae*). Phytotaxa 309(2): 101–117. <https://doi.org/10.11646/phytotaxa.309.2.1>
- Di Pietro R, Kuzmanović N, Iamónico D, Pignotti L, Barina Z, Lakušić D, Alegro A (2013) Typification of names in the *Sesleria juncifolia* species complex (*Poaceae*). Phytotaxa 152(1): 18–32. <https://doi.org/10.11646/phytotaxa.152.1.2>
- Fedorov AA [Ed.] (1969) Hromosomnye cislâ cvetkovykh rastenij [Chromosome numbers in flowering plants]. Academy of Sciences of the USSR, the Komarov V.L. Botanical Institute. Nauka, Leningrad, 926 pp.
- Foggi B, Nardi E, Rossi G (2001) Nomenclatural notes and typification in *Sesleria* Scop. (*Poaceae*). Taxon 50: 1101–1106. <https://doi.org/10.2307/1224726>
- Foggi B, Rossi G, Pignotti L (2007) *Sesleria pichiana* (*Poaceae*): a new species from North-West Italian peninsula. Webbia 62(1): 1–10. <https://doi.org/10.1080/00837792.2007.10670813>
- Hassemer G (2018) Advances to the taxonomic knowledge of *Plantago subulata* (*Plantago* sect. *Maritima*, *Plantaginaceae*). Turkish Journal of Botany 42: 653–661. <https://doi.org/10.3906/bot-1801-51>
- Hassemer G, Iamónico D, Ronsted N, Di Pietro R (2017) Typification of the Linnaean names *Plantago serraria* and *P. subulata* (*Plantago* subgenus *Coronopus*, *Plantaginaceae*). Taxon 66(3): 738–741. <https://doi.org/10.12705/663.14>
- Iamónico D, Hassemer G, Ronsted N, Di Pietro R (2017) The intricate nomenclatural questions around *Plantago holosteuum* (*Plantaginaceae*). Phytotaxa 306(1): 75–84. <https://doi.org/10.11646/phytotaxa.306.1.6>
- Lazarević M, Kuzmanović N, Lakušić D, Alegro A, Schönswetter P, Frajman B (2015) Patterns of cytotype distribution and genome size variation in the genus *Sesleria* Scop. (*Poaceae*). Botanical Journal of the Linnean Society 179: 126–143. <https://doi.org/10.1111/boj.12306>
- Lorenzo-Andreu A (1951) Cromosomas de plantas de la estepa de Aragón, III. Anales de la Estación Experimental de Aula Dei 2(2): 195–203.

- Lysák MA, Číhalíková J, Doležel J (1997) Morphometric and karyological analysis of a population of *Sesleria sadleriana* Janka in the Biele Karpaty Mountains (Slovakia). *Folia Geobotanica et Phytotaxonomica* 32(1): 47–55. <https://doi.org/10.1007/BF02803884>
- Lysák MA, Doležel J (1998) Estimation of nuclear DNA content in *Sesleria* (*Poaceae*). *Caryologia* 51: 123–132. <https://doi.org/10.1080/00087114.1998.10589127>
- Maamri F, Zermane N, Baik N, Nait Merzoug S, Bellahreche A (2016) Karyotype studies on eight populations of *Plantago albicans* L. from Algeria. *Caryologia* 69: 102–110. <https://doi.org/10.1080/00087114.2015.1109952>
- Májovský J [Ed.] (1976) Index of chromosome numbers of Slovakian flora (Part 5). *Acta Facultatis Rerum Naturalium Universitatis Comenianae, Botanica* 25: 1–18.
- Peruzzi L (2003) Reports 1344–1347. In: Kamari G, Blanché C, Garbari F (Eds) *Mediterranean chromosome number reports 13*. *Flora Mediterranea* 13: 370–373.
- Peruzzi L, Cesca G (2002) Chromosome numbers of flowering plants from Calabria, S Italy. *Willdenowia* 32(1): 33–44. <https://doi.org/10.3372/wi.32.32102>
- Petrova A (2000) Karyological study of some species of *Sesleria* (*Poaceae*) growing in Bulgaria. *Botanika Chronika* (Patras) 13: 133–140.
- Puech S (1987) Fertilité, aptitudes germinatives et caryotype dans deux populations de *Plantago albicans* L. (*Plantaginaceae*) en Tunisie. *Bulletin de la Société Botanique de France, Lettres Botaniques* 134(2): 145–154. <https://doi.org/10.1080/01811797.1987.10824738>
- Puech S (1988) Graines, aptitudes germinatives et caryotype de populations de *Plantago albicans* L. (*Plantaginaceae*) de Tunisie. 2. *Bulletin de la Société Botanique de France, Lettres Botaniques* 135: 353–359. <https://doi.org/10.1080/01811797.1988.10824811>
- Puech S, Rascol JP, Michel V, Andary C (1998) Cytogenetics and adaptation to increasingly arid environments: the example of *Plantago albicans* L. (*Plantaginaceae*). *Biochemical Systematics and Ecology* 26(3): 267–283. [https://doi.org/10.1016/S0305-1978\(97\)00111-7](https://doi.org/10.1016/S0305-1978(97)00111-7)
- Rahn K (1957) Chromosome numbers in *Plantago*. *Botanisk Tidsskrift* 53: 369–378.
- Runemark H (1967) Studies in the Aegean flora X. Cytologic and morphologic notes on *Plantago*. *Botaniska Notiser* 120: 9–16.
- Snogerup B (1985) Chromosome number reports LXXXIX. *Taxon* 34(4): 727–730. <https://doi.org/10.1002/j.1996-8175.1985.tb04449.x>
- Strgar V (1979) Kromosomska števila treh balkanskih seslerij. *Biološki Vestnik* (Ljubljana) 27: 71–74.
- Tornadore N, Marcucci R (1988) Attuali conoscenze citotassonomiche sulla flora pugliese. *Thalassia Salentina* 18: 77–86.
- Trombetta B, Granati A, D'Amato G, Sabina R, Martelli G, Di Pietro R (2005) Un approccio integrato (tassonomico, biosistemico e fitosociologico) allo studio del genere *Sesleria* Scop. nell'Appennino. *Informatore Botanico Italiano* 37(1): 58–59.
- Ujhelyi J (1960) Weitere zytotaxonomische Beiträge zur Kenntnis der Gattung *Sesleria*. *Botanikai Közlemények* (Budapest) 48(3–4): 278–282.
- Ujhelyi J, Felföldy LJM (1948) Cyto-taxonomical studies of *Sesleria sadleriana* Janka and *S. varia* (Jacq.) Wettst. *Archiva Biologica Hungarica* 18: 52–58.
- Vogt R, Oberprieler C (2009) *Plantago albicans* L. In: Marhold K (Ed.) *IAPT/IOPB chromosome data 8*. *Taxon* 58(4): 1281–1289. <https://doi.org/10.1002/tax.584017>