IAPT CHROMOSOME DATA

# IAPT chromosome data 37

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## IAPT chromosome data 37/1

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The study was supported by financial grant under JRF programme of CSIR providing Junior Research Fellowship financial assistance to Poonam Rani under scheme of CSIR [award letter no. 09/140(0161)/2016-EMR-I].

All materials CHN; collectors: *PG* = Puja Garg, *PR* = Poonam Rani, *RK* = Ramneet Kaur.

### ASTERACEAE

*Ageratum conyzoides* (L.) L., $n = 15$; India, Himachal Pradesh, *PG s.n.* (PUN 59863, PUN 59864, PUN 59865); India, Punjab, *PG s.n.* (PUN 59722).

### COMMELINACEAE

*Cyanotis cristata* (L.) D.Don., $n = 12 + 0–1B$; India, Himachal Pradesh, *PR s.n.* (PUN 62142, PUN 62143, PUN 62159).

*Tinantia erecta* (Jacq.) Fenzl., $n = 32$; India, Uttarakhand, *PR s.n.* (PUN 62708, PUN 26891). $n = 32 + 0–1B$; India, Uttarakhand, *PR s.n.* (PUN 62710). $n = 34$; India, Uttarakhand, *PR s.n.* (PUN 62709).

All materials for the chromosome column should be submitted electronically to: Karol Marhold, karol.marhold@savba.sk. The full version of this contribution is available in the online edition of TAXON appended to this article. The following citation format is recommended: Korobkov, A.A., Kotseruba, V.V. & Krivenko, D.A. 2019. IAPT chromosome data 30/4. In: Marhold, K. & Kučera, J. (eds.) & al., IAPT chromosome data 30. *Taxon* 68: 882, E1–E2.

#### MALVACEAE

*Abutilon indicum* (L.) Sweet, *n* = 21 + 0–1B; India, Rajasthan, *RK s.n.* (PUN 59949), *RK s.n.* (PUN 59951).
*Abutilon muticum* (Delile) Sweet, *n* = 21; India, Rajasthan, *RK s.n.* (PUN 59685).
*Abutilon ramosum* (Cav.) Guill. & Perr., *n* = 8; India, Punjab, *RK s.n.* (PUN 59800, PUN 59801).
*Abutilon theophrasti* Medik., *n* = 21; India, Punjab, *RK s.n.* (PUN 59799).

## IAPT chromosome data 37/2

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The study was financially supported by the Research Institute Forests and Rangeland of Iran (grant no. 12-09-09-071-09554-960433). The author is grateful to several collectors for material donation.

All materials CHN; collectors: *JM* = Javad Mohebi, *MG* = Mostafa Golipoor, *SMHH* = Seyed Mohsen Hesamzadeh Hejazi; vouchers in TARI.

#### LAMIACEAE

*Satureja atropatana* Bunge, 2*n* = 24; Iran, *MG 108758*.
*Satureja avromanica* Maroofi, 2*n* = 24; Iran, *MG 108768*.
*Satureja boissieri* Hausskn. ex Boiss., 2*n* = 30; Iran, *SMHH 108767*.
*Satureja edmondii* (Boiss. & Hausskn.) Briq., 2*n* = 30; Iran, *MG 108770*.
*Satureja intermedia* C.A.Mey., 2*n* = 30; Iran, *SMHH 108753*.
*Satureja isophylla* Rech.f., 2*n* = 30; Iran, *MG 108751*.
*Satureja kallarica* Jamzad, 2*n* = 30; Iran, *JM 108750*.
*Satureja kermanshahensis* Jamzad, 2*n* = 24; Iran, *JM 108749*.
*Satureja khuzistanica* Jamzad, 2*n* = 30; Iran, *SMHH 108748*.
*Satureja mutica* Fisch. & C.A.Mey., 2*n* = 60; Iran, *MG 108744*.
*Satureja spicigera* Boiss., 2*n* = 60; Iran, *SMHH 108755*.

## IAPT chromosome data 37/3

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The authors thank the Director, Botanical Survey of India, Kolkata, India for providing the laboratory and necessary facilities. We also thank the anonymous collectors who introduced some of the plants in the Botanic Garden from where material for the present study has been collected.

All materials CHN; collectors: *BSK* = Bhupendra Singh Kholia, *HS* = Harminder Singh, *PK* = Puneet Kumar; vouchers in BSD.

#### AMARYLLIDACEAE

*Allium stracheyi* Baker, *n* = 8; India, Pangi, *PK 128034*.
*Allium victorialis* L., *n* = 8; India, Pangi, *PK 127973*.

#### APOCYNACEAE

*Alstonia venenata* R.Br., *n* = 11; India, Dehradun, *PK 132701*.

#### ASPARAGACEAE

*Asparagus racemosus* Willd., *n* = 11; India, Dehradun, *PK 132704*.

#### ASTERACEAE

*Catamixis baccharoides* Thomson, *n* = 17; India, Dehradun, *PK 132719*.
*Himalaiella heteromalla* (D.Don) Raab-Straube, *n* = 16; India, Dehradun, *PK 132714*.
*Tricholepis roylei* Hook.f., *n* = 16; India, Himachal Pradesh, *PK 132702*.

#### BERBERIDACEAE

*Mahonia jaunsarensis* Ahrendt, *n* = 14; India, Dehradun, *PK 132711*.

#### CONVOLVULACEAE

*Ipomoea nil* (L.) Roth, *n* = 15; India, Dehradun, *PK 132727*.

#### FABACEAE

*Astragalus melanostachys* Benth. ex Bunge, *n* = 6; India, Pangi, *PK 128119*.
*Hedysarum microcalyx* Baker, *n* = 7; India, Pangi, *PK 132581*.
*Sophora mollis* (Royle) Baker, *n* = 9; India, Dehradun, *PK 132716*.

#### GENTIANACEAE

*Gentiana kurroo* Royle, *n* = 13; India, Himachal Pradesh, *PK 132729*.

#### GESNERIACEAE

*Rhynchoglossum obliquum* Blume, *n* = 10; India, Dehradun, *PK 132726*.

#### LAMIACEAE

*Phlomoides superba* (Royle ex Benth.) Kamelin & Makhm., *n* = 11, 2*n* = 22; India, Dehradun, *PK & HS 132717*.
*Pogostemon pumilus* (Graham) Press, *n* = 16; India, Dehradun, *PK 132707*.
*Vitex negundo* var. *purpurascens* Sivar. & Moldenke, *n* = 16; India, Dehradun, *PK 132721*.

#### LAURACEAE

*Persea odoratissima* (Nees) Kosterm., *n* = 12; India, Dehradun, *PK 132725*.

#### LILIACEAE

*Lilium polyphyllum* D.Don ex Royle, 2*n* = 24; India, Pangi, *PK 132581*.

#### MENISPERMACEAE

*Stephania glabra* (Roxb.) Miers, *n* = 13; India, Dehradun, *PK 132722*.

#### OLEACEAE

*Jasminum parkeri* Dunn, *n* = 13; India, Himachal Pradesh, *PK 132720*.

#### OPHIOGLOSSACEAE

*Ophioglossum reticulatum* L., *n* = ca. 630; India, Dehradun, *PK 132709*.

#### ORCHIDACEAE

*Eulophia dabia* (D.Don) Hochr., *n* = 24; India, Dehradun, *PK 132731*.
*Nervilia crociformis* (Zoll. & Moritzi) Seidenf., 2*n* = ca. 40; India, Dehradun, *PK 132730*.

#### OXALIDACEAE

*Oxalis debilis* Kunth, *n* = 24; India, Dehradun, *PK 132708*.

#### PAPAVERACEAE

*Papaver rhoeas* L., *n* = 7; India, Dehradun, *PK 132712*.

#### RANUNCULACEAE

*Aconitum heterophyllum* Wall. ex Royle, *n* = 8; India, Pangi, *PK 128182*.
*Delphinium ajacis* L., *n* = 8; India, Dehradun, *PK 132715*.
*Delphinium brunonianum* Royle, *n* = 8; India, Pangi, *PK 127401*.

#### ROSACEAE

*Agrimonia eupatoria* L., *n* = 28; India, Dehradun, *PK 132723*, *PK 132724*.

#### RUTACEAE

*Boenninghausenia albiflora* (Hook.) Rchb. ex Meisn, *n* = 10; India, Dehradun, *PK 132710*.

#### SOLANACEAE

*Physalis angulata* L., *n* = 24; India, Dehradun, *PK 132713*.
*Physalis minima* L., *n* = 24; India, Dehradun, *PK 132718*.
*Withania somnifera* (L.) Dunal, *n* = 24; Chandigarh, Dehradun, *PK 132703*.

#### THELYPTERIDACEAE

*Christella papilio* (C.Hope) K.Iwats., *n* = 36; India, Pithoragarh, *BSK 126259*.

#### ZINGIBERACEAE

*Hedychium flavum* Roxb., *n* = 17; India, Meghalaya, *PK 132728*.
*Kaempferia parviflora* Wall. ex Baker, *n* = 11; India, Meghalaya, *PK 132706*.

## IAPT chromosome data 37/4

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All materials CHN.

#### ANNONACEAE

*Annona mucosa* Jacq., 2*n* = 42; Mexico, Veracruz, San Andrés Tuxtla, 20 Apr 2013, *G.I. Manríquez 6465* (MO).

## IAPT chromosome data 37/5

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All materials FCM. PI FCM = absolute genome size expressed in picograms (pg) of DNA; DAPI FCM = relative genome size expressed in relative fluorescence intensities given in arbitrary units relative to the used standard (a.u.); DNA ploidy levels estimated by P. Mered'a Jr.; collectors: *IH* = I. Hodálová, *KS* = K. Skokanová, *PM* = P. Mered'a Jr., *SB* = S. Botlová, *SŠ* = S. Španiel; vouchers in SAV.

#### POLYGONACEAE

*Fallopia baldschuanica* (Regel) Holub
2*n* ~ 2*x* ~ 20, 2C = 3.176–3.201 pg, PI FCM; Slovak Republic, *PM 126-1A*, *PM 123*.
*Fallopia* ×*bohemica* (Chrtek & Chrtková) J.P.Bailey
2*n* ~ 6*x* ~ 66, 2C = 6.758–7.010 pg, PI FCM; Slovak Republic, *SB & PM 1058*, *SB & PM 1059*, *SB & PM 1061*, *SB & PM 1062*, *SB & PM 1055*, *SB & PM 1056*, *SB & PM 1057*, *SB 1072*, *SB & PM 1060*, *SB & PM 1063*, *SB & PM 1064*, *PM 61*, *PM 70B*, *PM 74*, *PM 51-1*, *PM 51-2*, *PM 51-3*, *PM 52*, *PM 59*, *PM 64*, *PM 78*, *PM 82*, *PM 102*, *PM 53B*, *PM 56*, *PM 57-1*, *PM 57-2*, *PM 58*, *SB & PM 1065*, *SB & PM 1066*;
2*n* ~ 6*x* ~ 66, 2C = 1.850–1.886 a.u., DAPI FCM; Austria, *KS & SŠ 280*, *KS & SŠ 282*, *KS & SŠ 281*, *KS & SŠ 283*; Croatia, *KS & SŠ 160*, *KS & SŠ 164*, *KS & SŠ 161*; Czech Republic, *KS & SŠ 490*, *IH 499*; Hungary, *KS & SŠ 167*, *KS & SŠ 166*, *KS & SŠ 165-1*, *KS & SŠ 165-2*; Romania, *KS 275*, *KS 276*;
2*n* ~ 8*x* ~ 88, 2C = 8.931–9.103 pg, PI FCM; Czech Republic, *PM 107-1*, *PM 107-2*, *PM 112*, *PM 116-1*, *PM 116-2*;
2*n* ~ 8*x* ~ 88, 2C = 2.408–2.530 a.u., DAPI FCM; Czech Republic, *PM 106*, *PM 107-2*, *PM 112*, *PM 116-2*.
*Fallopia dumetorum* (L.) Holub
2*n* ~ 2*x* ~ 20, 2C = 1.521 pg, PI FCM; Slovak Republic, *PM 127-1*.
*Fallopia japonica* (Houtt.) Ronse Decr. var. *japonica*
2*n* ~ 8*x* ~ 88, 2C = 9.339–9.663 pg, PI FCM; Czech Republic, *PM 114-1*, *PM 114-2*; Slovak Republic, *SB 1054, SB 1070*, *SB 1071*, *SB & PM 1041*, *SB & PM 1042*, *SB & PM 1043*, *SB & PM 1044*, *SB & PM 1045*, *SB & PM 1046*, *SB & PM 1047*, *SB & PM 1048*, *SB & PM 1049, SB & PM 1050*, *SB & PM 1051*, *SB & PM 1052, SB & PM 1053*, *PM 70J*, *PM 75*, *PM 53J-1*, *PM 55-1*, *PM 50*;
2*n* ~ 8*x* ~ 88, 2C = 2.547–2.589 a.u., DAPI FCM; Austria, *KS & SŠ 288*; Croatia, *KS & SŠ 163*, *KS & SŠ 162*; Czech Republic, *PM 114-2*; Poland, *KS & SŠ 491J*; Romania, *KS 274*, *KS 273*.
*Fallopia sachalinensis* (F.Schmidt) Ronse Decr.
2*n* ~ 4*x* ~ 44, 2C = 4.175–4.219 pg, PI FCM; Slovak Republic, *SB & PM 1067*, *SB & PM 1068*, *SB & PM 1069*;

$2n \sim 4x \sim 44$, 2C = 1.141–1.157 a.u., DAPI FCM; Austria, *KS & SŠ 287*; Poland, *KS & SŠ 491S*;
$2n \sim 8x \sim 88$, 2C = 8.558–8.790 pg, PI FCM; Czech Republic, *PM 103-1*, *PM 103-2*, *PM 104*, *PM 105*, *PM 108*, *PM 109*, *PM 113*, *PM 110*, *PM 111*;
$2n \sim 8x \sim 88$, 2C = 2.346–2.373 a.u., DAPI FCM; Czech Republic, *PM 103-2*, *PM 104*, *PM 105*, *PM 108*, *PM 109*, *PM 113*, *PM 110*, *PM 111*.

IAPT CHROMOSOME DATA

# IAPT chromosome data 37 – Extended version

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## IAPT chromosome data 37/1

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The study was supported by financial grant under JRF programme of CSIR providing Junior Research Fellowship financial assistance to Poonam Rani under scheme of CSIR [award letter no. 09/140(0161)/2016-EMR-I].

* First report of a new cytotype for the species.
** First report of B chromosome for the species.
\# First chromosome count for the species from India.
^ First report of B chromosome for the species from India.

Cytological investigations have been carried out from the immature unopened flower buds fixed in Carnoy's fixative (Ethyl alcohol : chloroform : glacial acetic acid, 6 : 3 : 1, v/v) for 24 h at room temperature and then transferred to 70% alcohol and squashed in 1% acetocarmine.

### ASTERACEAE

**Ageratum conyzoides* (L.) L.

*n* = 15; CHN. India, Himachal Pradesh, Hamirpur, 31.68°N, 76.52°E, 785 m, 23 Mar 2014, *P. Garg s.n.* (PUN 59863); India, Himachal Pradesh, Mandi, Rewalsar, 31.63°N, 76.83°E, 1360 m, 30 Mar 2014, *P. Garg s.n.* (PUN 59864, PUN 59865); India, Punjab, Patiala, Plant Conservatory, 30.36°N, 76.45°E, 251 m, 01 Apr 2014, *P. Garg s.n.* (PUN 59722) [Fig. 1G].

The present count of *n* = 15 for *Ageratum conyzoides* represents most probably the result of intraspecific hybridisation of diploid and tetraploid plants. Earlier, Nazeer & al. (1981) have reported the triploid cytotype as interspecific hybrid of *A. conyzoides* and *A. houstonianum*.

In *Ageratum conyzoides*, the meiotic chromosome numbers of *n* = 10, 20 were reported by a large number of workers (Ishikawa, 1916; Mehra & Sidhu, 1960; Löve & Löve, 1961; Turner & King, 1964; Kaul, 1967; Subramanyam & Kamble, 1967; Mehra & Remanandan, 1975; Bir & Sidhu, 1979; Sidhu & Pelia, 1987; Keil & al., 1988; Gupta & Gill, 1989; Nirmala & Rao, 1989; Gaonkar & Torne, 1991; Xie & Zheng, 2003).

### COMMELINACEAE

^*Cyanotis cristata* (L.) D.Don.

*n* = 12 + 0–1B, CHN. India, Himachal Pradesh, Nagrota, 32°06′34.2″N, 76°32′08.88″E, 733 m, 02 Jul 2017, *P. Rani s.n.* (PUN 62142); India, Himachal Pradesh, Bhompur, 32°06′34.128″N, 76°

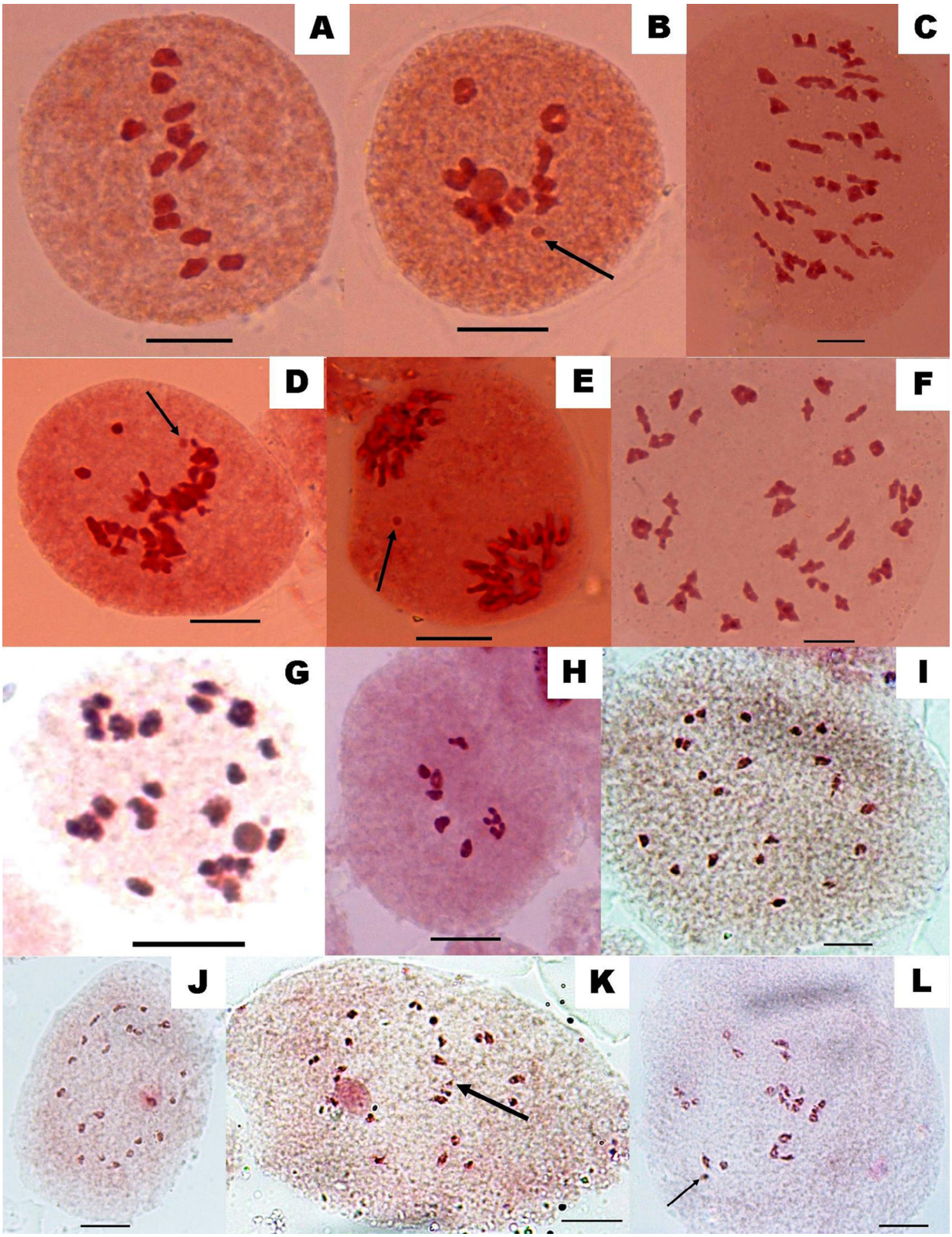


**Fig. 1. A & B**, *Cyanotis cristata*, male meiotic course: **A**, PMC showing 12 bivalents at metaphase-I; **B**, PMC showing small-sized B chromosome at diakinesis (arrowed); **C–F**, *Tinantia erecta*: **C**, PMC showing 32 bivalents at metaphase-I; **D**, PMC showing presence of smaller B chromosome at diakinesis (arrowed); **E**, PMC showing small-sized B chromosome at anaphase-I (arrowed); **F**, PMC showing 34 bivalents at metaphase-I; **G**, *Ageratum conyzoides*: meiocyte showing 15 bivalents at diakinesis; **H**, *Abutilon ramosum*: PMC showing the presence of 8 segregated bivalents at metaphase-I; **I**, *Abutilon theophrasti*: PMC showing 21 bivalents at metaphase-I; **J**, *Abutilon muticum*: PMC showing 21 bivalents at metaphase-I; **K & L**, *Abutilon indicum*: PMC showing B chromosome at diakinesis and at metaphase-I (arrowed). — Scale bars: 10 µm.

22′33.78″E, 738 m, 10 Jul 2017, *P. Rani s.n.* (PUN 62143); India, Himachal Pradesh, Gagret, 31°39′34.92″N, 76°03′42.84″E, 439 m, 20 Jul 2018, *P. Rani s.n.* (PUN 62159) [Fig. 1A,B].

Three accessions showed a B chromosome along with 12 bivalents at diakinesis (Fig. 1A,B), which is in agreement with the previous report of $2n = 24 + 0–1B$ from Bangladesh (Islam & Baten, 1952). This is the first report of B chromosome for Indian accession.

*Tinantia erecta* (Jacq.) Fenzl.

# $n = 32$, CHN. India, Uttarakhand, Mussoorie, Laltiba, 28°33′3.672″N, 77°10′10.308″E, 2290 m, 25 Jul 2018, *P. Rani s.n.* (PUN 62708); India, Uttarakhand, Mall road, 30°27′29.34″N, 78°04′24.564″E, 2006 m, 25 Jul 2018, *P. Rani s.n.* (PUN 26891); India, Uttarakhand, Company Garden, 25°55′21.057″N, 81°59′05.5392″E, 2006 m, 25 Jul 2018, *P. Rani s.n.* (PUN 62710) [Fig. 1C].

**$n = 32 + 0–1B$; CHN. India, Uttarakhand, Mussoorie, Company Garden, 25°55′21.057″N, 81°59′05.5392″E, 2006 m, 25 Jul 2018, *P. Rani s.n.* (PUN 62710) [Fig. 1D,E].

# $n = 34$; CHN. India, Uttarakhand, Mussoorie, Mossy Fall, 46°05′59.136″N, 65°35′31.776″E, 2006 m, 20 Jul 2019, *P. Rani s.n.* (PUN 62709) [Fig. 1F].

Three accessions, from Laltiba, Company Garden and Mall Road, Mussoorie showed the chromosome number of $n = 32$ in the pollen mother cells (PMCs) at metaphase I (Fig. 1C). Plants collected from Mossy fall showed the chromosome count of $n = 34$ at metaphase I (Fig. 1F). These cytotypes ($n = 32$ and $n = 34$) are in agreement with the observations made on American accessions of the species (Darlington, 1929; Anderson & Sax, 1936; Heitz, 1968; Jones & Jopling, 1972). The only previous report available from India of $n = 33$ for this species is from Mussoorie (Mehra & Sachdeva, 1976). Both the cytotypes $n = 32$ and 34 were found to be diploid based on $x = 16$ and 17 (Darlington, 1929). Meiotic studies on the accession of *Tinantia erecta* collected from Company Garden revealed the prevalence of B chromosome in the plants (Fig. 1D,E). Thus, the gametophytic chromosome count was detected to be $n = 32 + 0–1B$, which is the first report of occurrence of B chromosomes in the species at global level.

## MALVACEAE

***Abutilon indicum* (L.) Sweet

$n = 21 + 0–1B$; CHN. India, Rajasthan, Jaipur, 26°50′06.9036″N, 75°49′27.6276″E, 431 m, 06 Mar 2015, *R. Kaur s.n.* (PUN 59949); India, Rajasthan, Udaipur, 24°34′16.5720″N, 73°41′29.5584″E, 423 m, 08 Mar 2015, *R. Kaur s.n.* (PUN 59951) [Fig. 1K,L].

Presence of one B chromosome along with 21 bivalents ($n = 21 + 0–1B$) in two populations of *Abutilon indicum* from Rajasthan is the first ever report of B chromosomes in the genus *Abutilon* at diakinesis and metaphase I (Fig. 1K,L). The chromosome number ($2n = 42$) for *A. indicum* has also been previously reported by many workers (Bir & Sidhu, 1980; Krishnappa & Munirajappa, 1983; Carr, 1985; Husain & al., 1988; Munirajappa & Krishnappa, 1993; Cheng & Tsai, 1999).

# *Abutilon muticum* (Delile) Sweet

$n = 21$; CHN. India, Rajasthan, Bikaner, 28°02′N, 73°31′E, 242 m, 27 Sep 2013, *R. Kaur s.n.* (PUN 59685) [Fig. 1J].

*Abutilon muticum* ($n = 21$) has been studied for the first time from India and the revealed chromosome number is in accordance with the earlier records for this species from outside of India (Fig. 1J). Husain & al. (1988) reported the presence of $2n = 42$ chromosomes in *A. muticum*.

**Abutilon ramosum* (Cav.) Guill. & Perr.

$n = 8$; CHN. India, Punjab, Sangrur, Lehragaga, 30°22′N, 75°53′E, 237 m, 23 Aug 2015, *R. Kaur s.n.* (PUN 59800); India, Punjab, Sangrur, 30°22′N, 75°53′E, 237 m, 23 Aug 2015, *R. Kaur s.n.* (PUN 59801) [Fig. 1H].

Two populations of *Abutilon ramosum* collected from Lehragaga (Sangrur) showed $n = 8$ (Fig. 1H) as haploid chromosome number. The count of $n = 8$ for *A. ramosum* is the first report of this number (Gill & Kaur, 2015). Gupta & Kaur (2016) reported the presence of $2n = 42$ chromosomes in *A. ramosum*.

# *Abutilon theophrasti* Medik.

$n = 21$; CHN. India, Punjab, Patiala, 30°22′N, 75°32′E, 257 m, 10 Oct 2012, *R. Kaur s.n.* (PUN 59799) [Fig. 1I].

*Abutilon theophrasti* with $n = 21$ (Fig. 1I) is reported from the Patiala collection for the first time from India, and the present count is in line with the previous records from outside of India (Skovsted, 1935, 1941; Ford, 1938; Podlech & Dieterle, 1969; Uhríková & Májovský, 1980; Markova, 1982; Rudyka, 1986; Markova & Goranova, 1993; Shatokhina, 2006).

## LITERATURE CITED

**Anderson, E. & Sax, K.** 1936. A cytological monograph of the American species of *Tradescantia*. *Bot. Gaz.* 97: 433–476. https://doi.org/10.1086/334582

**Bir, S.S. & Sidhu, M.** 1979. Cytological observations in weed flora of orchards of Patiala District, Punjab. *Recent Res. Pl. Sci.* 7: 261–271.

**Bir, S.S. & Sidhu, M.** 1980. Cyto-palynological studies on weed flora of cultivable lands of Patiala District (Punjab). *J. Palynol.* 16: 85–105.

**Carr, G.D.** 1985. Additional chromosome numbers of Hawaiian flowering plants. *Pacific Sci.* 39: 302–304.

**Cheng, Y.F & Tsai, J.L.** 1999. Chromosome study of the Malvaceae in Taiwan. *Quart. J. Forest Res.* 21: 61–72.

**Darlington, C.D.** 1929. Chromosome behaviour and structural hybridity in the Tradescantiae. *J. Genet.* 21: 207–286. https://doi.org/10.1007/BF02984208

**Ford, C.E.** 1938. A contribution to a cytogenetical survey of the Malvaceae. *Genetica* 20: 431–453. https://doi.org/10.1007/BF01531777

**Gaonkar, R.V. & Torne, S.G.** 1991. Induced autotetraploidy in *Ageratum conyzoides* L. *Cytologia* 56: 327–331. https://doi.org/10.1508/cytologia.56.327

**Gill, A. & Kaur, R.** 2015. Cytomorphological investigations of some species of *Abutilon* Mill. from Punjab. *J. New Biol. Rep.* 4: 219–227.

**Gupta, R.C. & Gill, B.S.** 1989. Cytopalynology of North and Central Indian Compositae. *J. Cytol. Genet.* 24: 96–105.

**Gupta, R.C. & Kaur, K.** 2016. Chromosomal variation in some members of Malvales Juss. from Rajasthan, India. *Nucleus* 59: 211–217. https://doi.org/10.1007/s13237-016-0176-1

**Heitz, B.** 1968. Commelinaceae II. *Inform. Annuelles Caryosyst. Cytogén.* 2: 26–32.

**Husain, A.S., Saeed, V.A. & Husain, S.S.** 1988. Cytological investigation in *Abutilon* Mill. from Pakistan. *Pakistan J. Bot.* 20: 191–199.

**Ishikawa, M.** 1916. The chromosome numbers of some Compositae. *Bot. Mag. (Tokyo)* 25: 399.

**Islam, A.S. & Baten, A.** 1952. Cytology of *Cyanotis*. *Nature* 169: 457–458. https://doi.org/10.1038/169457b0

**Jones, K. & Jopling, C.** 1972. Chromosomes and the classification of the Commelinaceae. *Bot. J. Linn. Soc*. 65: 129–162. https://doi.org/10.1111/j.1095-8339.1972.tb00929.x

**Kaul, M.L.H.** 1967. Cytogenetics of polyploids. III. Dauermodifications in *Ageratum conyzoides* L. *Cytologia* 32: 147–156. https://doi.org/10.1508/cytologia.32.147

**Keil, D.J., Luckow, M.A. & Pinkava, D.J.** 1988. Chromosome studies in Asteraceae from the United States, Mexico, the West Indies, and South America. *Amer. J. Bot*. 75: 652–668. https://doi.org/10.1002/j.1537-2197.1988.tb13488.x

**Krishnappa, D.G. & Munirajappa** 1983. Polyploidy in the speciation of the genus *Abutilon*. *Proc. Indian Sci. Congr. Assoc*. 70: 89–90.

**Löve, Á. & Löve, D.** 1961. Chromosome numbers of central and north-west European plant species. *Opera Bot*. 5: 1–581.

**Markova, M.L.** 1982. [Reports]. P. 761 in: Löve, Á. (ed.), IOPB chromosome number reports LXXVII. *Taxon* 31: 761–777. https://doi.org/10.1002/j.1996-8175.1982.tb03587.x

**Markova, M.L. & Goranova, V.Y.** 1993. Karyological study of representatives of family Malvaceae in Bulgaria. *Fitologija* 46: 12–32.

**Mehra, P.N. & Remanandan, P.** 1975. Cytological investigations on Indian Compositae IV. Tribes Senecioneae, Eupatorieae, Vernonieae and Inuleae. *Nucleus* 18: 6–19. https://doi.org/10.1508/cytologia.41.31

**Mehra, P.N. & Sachdeva, S.K.** 1976. Cytological observations on some W. Himalayan monocots IV. Several families. *Cytologia* 41: 31–53.

**Mehra, P.N. & Sidhu, S.S.** 1960. Cytology of the North-West Indian Compositae. *Proc. Indian Sci. Congr. Assoc*. 47(3): 376–377.

**Munirajappa & Krishnappa, D.G.** 1993. Cytotaxonomic studies in some south Indian species of *Abutilon*. *J. Cytol. Genet*. 28: 71–76.

**Nazeer, M.A., Subramanyam, G.V., Madusoodanan, K.J. & Ohri, D.** 1981. Cytology of triploid hybrid of *Ageratum* Linn. *Curr. Sci*. 50: 97–98.

**Nirmala, A. & Rao, P.N.** 1989. Karyotype studies in some Asteraceae. *Cell Chromosome Res*. 12: 17–18.

**Podlech, D. & Dieterle, A.** 1969. Chromosomenstudien an afghanischen Pflanzen. *Candollea* 24: 185–243.

**Rudyka, E.G.** 1986. Chromosome numbers in some representatives of the Alliaceae, Fabaceae, Malvaceae, Poaceae families. *Bot. Zhurn. (Moscow & Leningrad)* 71: 1426 –1427.

**Shatokhina, A.V.** 2006. Chromosome numbers of some plants of the Amur Region flora. *Bot. Zhurn. (St. Petersburg)* 91: 487–490.

**Sidhu, M. & Pelia, S.S.** 1987. Karyomorphology of some species of weeds – Compositae. *J. Cytol. Genet*. 22: 143–150.

**Skovsted, A.** 1935. Chromosome numbers in the Malvaceae. *Int. J. Genet*. 31: 263–296. https://doi.org/10.1007/BF02982344

**Skovsted, A.** 1941. Chromosome numbers in the Malvaceae II. *Compt.-Rend. Trav. Carlsberg Lab*. 23: 195–242.

**Subramanyam, K. & Kamble, N.P.** 1967. [Reports]. In: Löve, Á. (ed.), IOPB chromosome number reports XII. *Taxon* 16: 341–350. https://doi.org/10.1002/j.1996-8175.1967.tb02097.x

**Turner, B.L. & King, R.M.** 1964. Chromosome numbers in the Compositae VIII. Mexican and Central American species. *S. W. Naturalist* 9: 27–39. https://doi.org/10.2307/3669100

**Uhríková, A. & Májovský, J.** 1980. [Reports]. Pp. 725–726 in: Löve, Á. (ed.), IOPB chromosome number reports LXIX. *Taxon* 29: 703–730. https://doi.org/10.1002/j.1996-8175.1980.tb00607.x

**Xie, Z.Y. & Zheng, C.M.** 2003. Cytological studies on 13 species of Compositae from Hainan, China. *Acta Phytotax. Sin*. 41: 545–552.

## IAPT chromosome data 37/2

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* First chromosome count from Iran.
** First chromosome count for the species.

### LAMIACEAE

***Satureja atropatana* Bunge
$2n = 2x = 24$; CHN. Iran, Tabriz, Ahar, Khajeh, 38°08′56″N, 46°28′01″E, 1544 m, 10 Sep 2019, *M. Golipoor 108758* (TARI) [Fig. 2A].

***Satureja avromanica* Maroofi
$2n = 2x = 24$; CHN. Iran, Kordestan, Avramanat Takht, 34°14′13″N, 45°17′18″E, 937 m, 12 Aug 2019, *M. Golipoor 108768* (TARI) [Fig. 2B].

***Satureja boissieri* Hausskn. ex Boiss.
$2n = 2x = 30$; CHN. Iran, Gilan, 36°50′52″N, 49°44′15″E, 1800 m, 10 Sep 2019, *S.M. Hesamzadeh Hejazi 108767* (TARI) [Fig. 2C].

***Satureja edmondii* (Boiss. & Hausskn.) Briq.
$2n = 2x = 30$; CHN. Iran, Kermanshah, Songhor, 34°28′46″N, 47°21′48″E, 1457 m, 12 Oct 2019, *M. Golipoor 108770* (TARI) [Fig. 2D].

***Satureja intermedia* C.A.Mey.
$2n = 2x = 30$; CHN. Iran, Mazandaran, Yoosh, 36°10′38″N, 51°46′26″E, 2200 m, 06 Sep 2018, *S.M. Hesamzadeh Hejazi 108753* (TARI) [Fig. 2E].

***Satureja isophylla* Rech.f.
$2n = 2x = 30$; CHN. Iran, Mazandaran, Kalardasht, Roodbarak, 36°29′25″N, 51°08′33″E, 1770 m, 07 Sep 2019, *M. Golipoor 108751* (TARI) [Fig. 2F].

***Satureja kallarica* Jamzad
$2n = 2x = 30$; CHN. Iran, Shahr-e-Kord, Shalamzar, 32°04′53″N, 50°48′55″E, 2800 m, 15 Sep 2018, Iran, *J. Mohebi 108750* (TARI) [Fig. 2G].

***Satureja kermanshahensis* Jamzad
$2n = 2x = 24$; CHN. Iran, Kermanshah towards Somar, Village Villa, 33°59′52″N, 46°02′39″E, 1180 m, 10 Sep 2018, *J. Mohebi 108749* (TARI) [Fig. 2H].

**Satureja khuzistanica* Jamzad
$2n = 2x = 30$; CHN. Iran, Lorestan, Pol-e-Dokhtar towards Andimeshk, 32°47′50″N, 48°49′21″E, 502 m, 05 Oct 2019, *S.M. Hesamzadeh Hejazi 108748* (TARI) [Fig. 2I].
For the other chromosome number report for this species from Iran, see Shariat & al. (2013).

**Satureja mutica* Fisch. & C.A.Mey.
$2n = 4x = 60$; CHN. Iran, Mazandaran, Pol-e-sephid, 36°01′11″N, 53°02′53″E, 865 m, 20 Sep 2019, *M. Golipoor 108744* (TARI) [Fig. 2J].

For the other chromosome number reports for this species from Iran, see Irani & al. (2014).

**Satureja spicigera* Boiss.

$2n = 4x = 60$; CHN. Iran, Gilan, Roodbar, Ganjeh, 36°51′23″N, 49°27′42″E, 309 m, 12 Sep 2019, *S.M. Hesamzadeh Hejazi 108755* (TARI) [Fig. 2K].

For the other chromosome number reports for this species from Iran, see Shariat & al. (2013) and Irani & al. (2014).

In this study, 11 species of the genus *Satureja* of the Lamiaceae family have been studied in detail in terms of cytogenetic parameters. All of the species are endemic to Iran except *S. boissieri*, *S. mutica* and *S. spicigera*.

An image analysis system was used to study the karyotypic diversity. Seeds of studied species were planted, and after their germination, the root end meristem was used for karyotype studies.

According to this study, the basic chromosome numbers of the examined *Satureja* species are $x = 12$ and 15. The levels of ploidy are diploid and tetraploid. Tetraploid species were *S. mutica* and *S. spicigera*.


## LITERATURE CITED

**Irani, P., Hesamzadeh Hejazi, S.M. & Tabaei Aghdaei, S.R.** 2014. Karyological study on four species of *Satureja* (Lamiaceae) in Iran. *Int. J. Biosci.* 4: 229–240. https://doi.org/10.12692/ijb/4.7.229-240

**Shariat, A., Karimzadeh, G. & Assareh, M.H.** 2013. Karyology of Iranian endemic *Satureja* (Lamiaceae) species. *Cytologia* 78: 305–312. https://doi.org/10.1508/cytologia.78.305


## IAPT chromosome data 37/3


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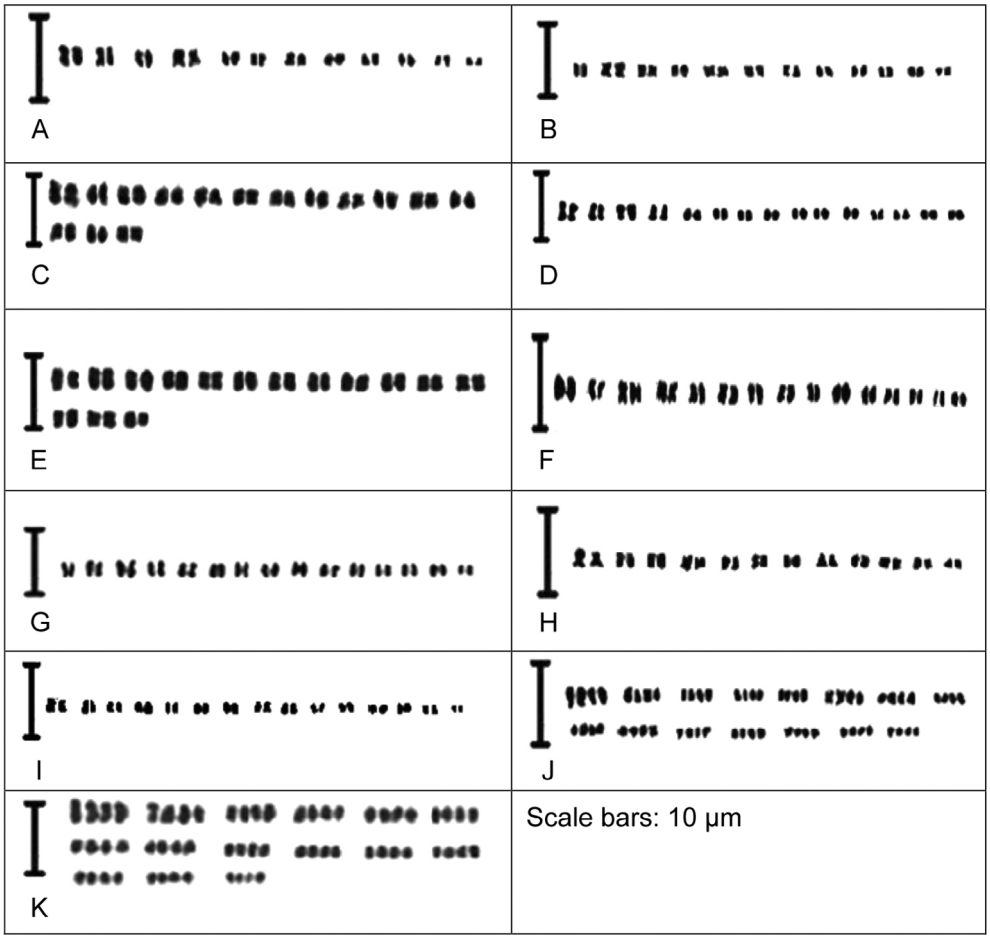


**Fig. 2.** Mitotic karyotype. **A**, *Satureja atropatana*, $2n = 24$ (haploid karyotype formula, HKF: 12m); **B**, *S. avromanica*, $2n = 24$ (HKF: 12m); **C**, *S. boissieri*, $2n = 30$ (HKF: 15m); **D**, *S. edmondii*, $2n = 30$ (HKF: 15m); **E**, *S. intermedia*, $2n = 30$ (HKF: 15m); **F**, *S. isophylla*, $2n = 30$ (HKF: 15m); **G**, *S. kallarica*, $2n = 30$ (HKF: 14m + 1sm); **H**, *S. kermanshahensis*, $2n = 24$ (HKF: 11m + 1sm); **I**, *S. khuzistanica*, $2n = 30$ (HKF: 10m + 5sm); **J**, *S. mutica*, $2n = 60$ (HKF: 25m + 5sm); **K**, *S. spicigera*, $2n = 60$ (HKF: 30m).

* First chromosome count for the species.
** First chromosome count for the species for India.
\# First chromosome count for the species from the western Himalayas, India.
^ New cytotype for the species.

**AMARYLLIDACEAE**

*Allium stracheyi* Baker

*n* = 8, CHN. India, Himachal Pradesh, Chamba, Pangi, Eco-sensitive zone, towards Sidhani Dhar, 3272 m, 33°01.612′N, 76° 38.275′E, on rocky substratum on slope, 05 Jun 2018, *P. Kumar 128034* (BSD).

*Allium victorialis* L.

*n* = 8, CHN. India, Himachal Pradesh, Chamba, Pangi, Sidhani Dhar, 2746 m, 32°58.113′N, 76°33.551′E, in humid shady places in Betula forest, 03 Jun 2018, *P. Kumar 127973* (BSD).

**APOCYNACEAE**

*Alstonia venenata* R.Br.

*n* = 11, CHN. India, Uttarakhand, Dehradun, Dhanvantri vatika, Botanical Survey of India, Northern Regional Centre, 685 m, 30° 20.9167′N, 78°00.7833′E, partly shady place, 24 Oct 2020, *P. Kumar 132701* (BSD).

**ASPARAGACEAE**

*Asparagus racemosus* Willd.

*n* = 11, CHN. India, Uttarakhand, Dehradun, forest backside Kaulagarh, 631 m, 30°21.075′N, 77°59.6536′E, shady place, 24 Jul 2020, *P. Kumar 132704* (BSD).

**ASTERACEAE**

**Catamixis baccharoides* Thomson

*n* = 17, CHN. India, Uttarakhand, Dehradun, Mohand forest, 910 m, 30°18.637′N, 78°02.154′E, dry slope (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 10 May 2020, *P. Kumar 132719* (BSD) [Fig. 3A,B].

*Himalaiella heteromalla* (D.Don) Raab-Straube

*n* = 16, CHN. India, Uttarakhand, Dehradun, Botanical Survey of India, Northern Regional Centre, growing as a weed, 685 m, 30° 20.895′N, 78°00.967′E, partly shady place, 24 Feb 2020, *P. Kumar 132714* (BSD).

*Tricholepis roylei* Hook.f.

*n* = 16, CHN. India, Himachal Pradesh, Sangdha, 2582 m, 30° 44.374′N, 77°52.030′E, on open hill slopes (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 01 Jul 2020, *P. Kumar 132702* (BSD).

**BERBERIDACEAE**

**Mahonia jaunsarensis* Ahrendt

*n* = 14, CHN. India, Uttarakhand, Dehradun, Chakrata, Deoban, 2400 m, 30°44.8321′N, 77°51.7002′E, partly shady places in coniferous forest (collected and introduced in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 20 Mar 2020, *P. Kumar 132711* (BSD) [Fig. 3C,D].

**CONVOLVULACEAE**

*Ipomoea nil* (L.) Roth

*n* = 15, CHN. India, Uttarakhand, Dehradun, Botanic Garden, Botanical Survey of India, Northern Regional Centre, growing as a weed, 685 m, 30°20.85′N, 78°00.7833′E, partly shady place, 25 Sep 2020, *P. Kumar 132727* (BSD).

**FABACEAE**

*Astragalus melanostachys* Benth. ex Bunge

*n* = 6, CHN. India, Himachal Pradesh, Chamba, Pangi, along Triund Nalha towards Chogalu Dhar, 3408 m, 33°4.6453′N, 76° 37.4997′E, moist grassy places near stream, 09 Jul 2019, *P. Kumar 128119* (BSD).

*Hedysarum microcalyx* Baker

*n* = 7, CHN. India, Himachal Pradesh, Chamba, Pangi, Sidhani Dhar, 3693 m, 32°55.569′N, 76°37.897′E, on shady slopes, 17 Jul 2017, *P. Kumar 127557* (BSD).

\# *Sophora mollis* (Royle) Baker

*n* = 9, CHN. India, Uttarakhand, Dehradun, Sahastradhara, 969 m, 30°23.0245′N, 78°07.8664′E, on open hill slopes (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 28 Mar 2020, *P. Kumar 132716* (BSD).

**GENTIANACEAE**

*Gentiana kurroo* Royle

*n* = 13, CHN. India, Himachal Pradesh, Sangdha, 1347 m, 30° 40.033′N, 77°25.597′E, on open hill slopes (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 10 Oct 2020, *P. Kumar 132729* (BSD).

**GESNERIACEAE**

***Rhynchoglossum obliquum* Blume

*n* = 10, CHN. India, Uttarakhand, Dehradun, Botanic Garden, Zingiber Section, Botanical Survey of India, Northern Regional Centre, growing as weed in a shady moist place, 685 m, 30°20.7833′N, 78°00.7833′E, 25 Sep 2020, *P. Kumar 132726* (BSD).

**LAMIACEAE**

*Phlomoides superba* (Royle ex Benth.) Kamelin & Makhm.

*n* = 11, CHN. India, Uttarakhand, Dehradun, near Mohand forest, 441 m, 30°10′N, 77°53′E, (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 20 Mar 2020, *P. Kumar & H. Singh 132717* (BSD).

**Pogostemon pumilus* (Graham) Press

*n* = 16, CHN. India, Uttarakhand, Dehradun, Bhopal Pani Village, along seasonal river, 560 m, 30°15.08′N, 78°09.0173′E, open marshy place, 10 Jul 2020, *P. Kumar 132707* (BSD) [Fig. 3E,F].

**Vitex negundo* var. *purpurascens* Sivar. & Moldenke

*n* = 16, CHN. India, Uttarakhand, Dehradun, Dhanvantri vatika, Botanical Survey of India, Northern Regional Centre, 685 m, 30° 20.8455′N, 78°00.8295′E, partly shady place, 05 Aug 2020, *P. Kumar 132721* (BSD) [Fig. 3G,H].

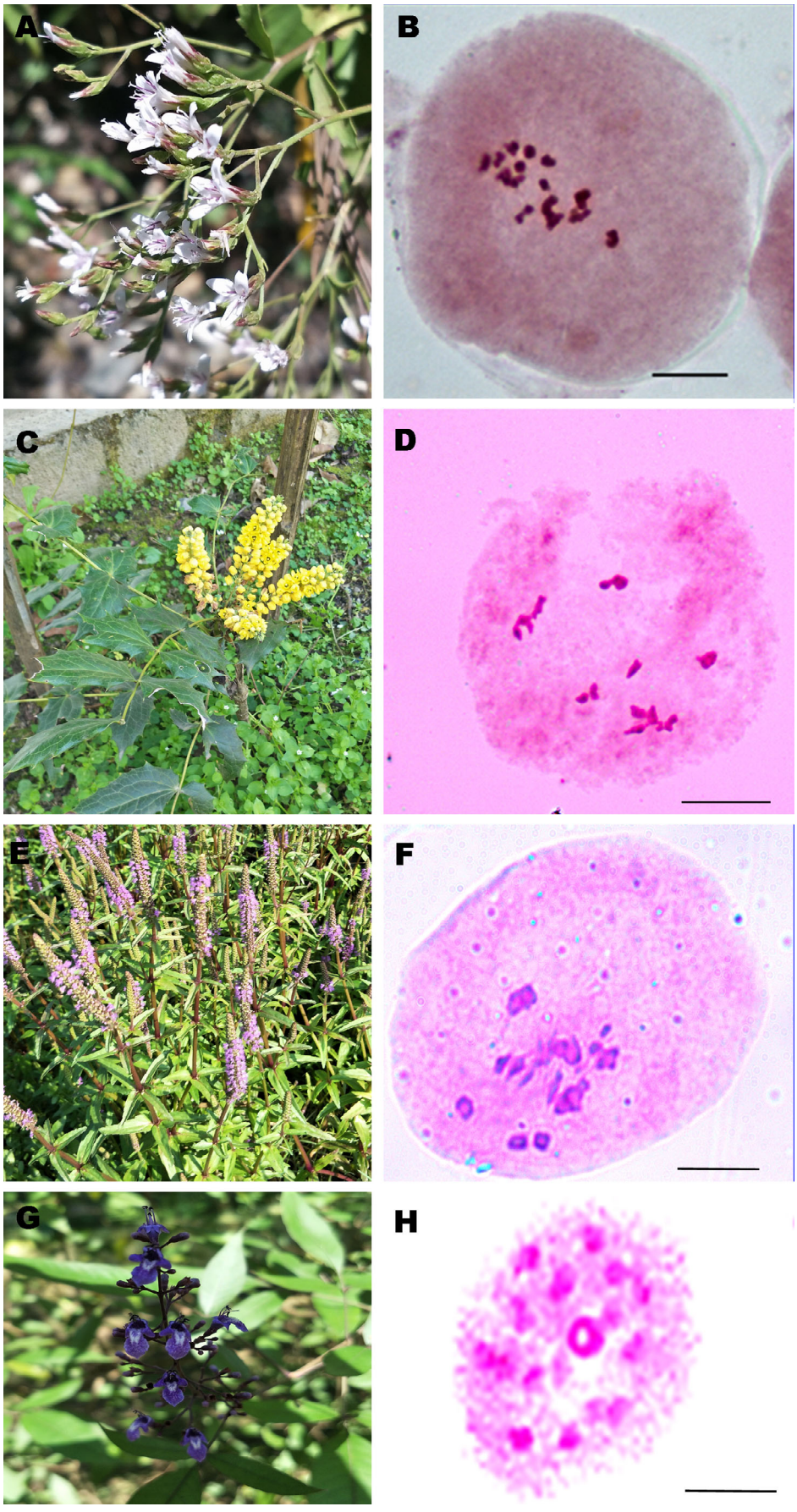


**Fig. 3. A**, *Catamixis baccharoides*, an inflorescence with capitula; **B**, *C. baccharoides*, PMC at metaphase I, $n = 17$; **C**, *Mahonia jaunsarensis*, an individual with yellow flowers in racemes; **D**, *M. jaunsarensis*, PMC at metaphase I, $n = 14$; **E**, *Pogostemon pumilus*, group of individuals in its marshy habitat; **F**, *P. pumilus*, PMC at metaphase I, $n = 16$; **G**, *Vitex negundo* var. *purpurascens*, a flowering branch with purple blue flowers; **H**, *V. negundo* var. *purpurascens*, PMC at diakinesis, $n = 16$. — Scale bars = 10 µm. Photos: Puneet Kumar.

**LAURACEAE**

*Persea odoratissima* (Nees) Kosterm.

*n* = 12, CHN. India, Uttarakhand, Dehradun, backside of Botanical Survey of India garage, 685 m, 30°20.8023′N, 78°00.7377′E, open place, 25 Mar 2020, *P. Kumar 132725* (BSD).

**LILIACEAE**

*Lilium polyphyllum* D.Don ex Royle

2*n* = 24, CHN. India, Himachal Pradesh, Chamba, Pangi, Sidhani Dhar, 2752 m, 32°58.142′N, 76°33.5288′E, on shady slopes, 13 Jul 2019, *P. Kumar 132581* (BSD).

**MENISPERMACEAE**

***Stephania glabra* (Roxb.) Miers

*n* = 13, CHN. India, Uttarakhand, Dehradun, Botanic Garden, Botanical Survey of India, Northern Regional Centre, growing as an escape, 685 m, 30°20.85′N, 78°00.7833′E, shady place, 15 Jul 2020, *P. Kumar 132722* (BSD).

**OLEACEAE**

***Jasminum parkeri* Dunn

*n* = 13, CHN. India, Himachal Pradesh, Chamba, Holi village, 1955 m, 32°18.544′N, 76°34.757′E, on dry hill slopes (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 26 Apr 2020, *P. Kumar 132720* (BSD).

**OPHIOGLOSSACEAE**

*Ophioglossum reticulatum* L.

*n* = ca. 630, CHN. India, Uttarakhand, Dehradun, near Santala Devi Mandir, 728 m, 30°24.1178′N, 78°00.8919′E, river bed (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 20 Aug 2020, *P. Kumar 132709* (BSD).

**ORCHIDACEAE**

*Eulophia dabia* (D.Don) Hochr.

*n* = 24, CHN. India, Uttarakhand, Dehradun, Rajaji National Park, 349 m, 29°56′N, 78°11′E, grassy place (collected and introduced in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 04 Mar 2020, *P. Kumar 132731* (BSD).

^ *Nervilia crociformis* (Zoll. & Moritzi) Seidenf.

2*n* = ca. 40, CHN. India, Uttarakhand, Dehradun, near Lakshaman Sidh Mandir, 714 m, 30°14′N, 78°4′E, as forest undergrowth (introduced and collected in Botanic Garden, Orchid House, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 28 Jun 2020, *P. Kumar 132730* (BSD).

**OXALIDACEAE**

*Oxalis debilis* Kunth

*n* = 24, CHN. India, Uttarakhand, Dehradun, Botanical Survey of India, Northern Regional Centre, growing as a weed, 685 m, 30°20.895′N, 78°00.967′E, partly shady places, 20 Feb 2020, *P. Kumar 132708* (BSD).

**PAPAVERACEAE**

*Papaver rhoeas* L.

*n* = 7, CHN. India, Uttarakhand, Dehradun, Botanic Garden, Zingiber Section, Botanical Survey of India, Northern Regional Centre, as an escape, 685 m, 30°20.7833′N, 78°00.7833′E, open places, 01 Mar 2020, *P. Kumar 132712* (BSD).

**RANUNCULACEAE**

*Aconitum heterophyllum* Wall. ex Royle

*n* = 8, CHN. India, Himachal Pradesh, Chamba, Pangi, along Triund Nalha, 3454 m, 33°04.808′N, 76°37.453′E, moist alpine grassy slopes, 09 Jul 2019, *P. Kumar* 128182 (BSD).

*Delphinium ajacis* L.

*n* = 8, CHN. India, Uttarakhand, Dehradun, Botanic Garden, Botanical Survey of India, Northern Regional Centre, as an escape, 685 m, 30°20.7833′N, 78°0.7833′E, open places, 01 Mar 2020, *P. Kumar 132715* (BSD).

*Delphinium brunonianum* Royle

*n* = 8, CHN. India, Himachal Pradesh, Chamba, Pangi, Pepe Nalla, Chasakh Bhatori, along stream side, 3862 m, 32°56.254′N, 76°38.293′E, open places, 16 Jul 2017, *P. Kumar 127401* (BSD).

**ROSACEAE**

*Agrimonia eupatoria* L.

*n* = 28, CHN. India, Uttarakhand, Dehradun, Chakrata, Deoban, 2400 m, 30°45′09.936″N, 77°52′35.508″E, partly shady places coniferous forest, 10 Jul 2020, *P. Kumar 132723* (BSD); India, Uttarakhand, Dehradun, Bhadraj, 2400 m, 30°28.7591′N, 77°57.2597′E, on the edge of the *Quercus* forest in partly shady places, 10 Jul 2020, *P. Kumar 132724* (BSD).

**RUTACEAE**

*Boenninghausenia albiflora* (Hook.) Rchb. ex Meisn

*n* = 10, CHN. India, Uttarakhand, Dehradun, Chakrata, Deoban, 2400 m, 30°44.8321′N, 77°51.7002′E, partly shady places in coniferous forest (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 12 Jul 2020, *P. Kumar 132710* (BSD).

**SOLANACEAE**

*Physalis angulata* L.

*n* = 24, CHN. India, Uttarakhand, Dehradun, Botanical Survey of India, Northern Regional Centre, growing as a weed, 685 m, 30° 20.9141′N, 78°01.056′E, partly shady places, 20 Mar 2020, *P. Kumar 132713* (BSD).

*Physalis minima* L.

*n* = 24, CHN. India, Uttarakhand, Dehradun, Botanical Survey of India, Northern Regional Centre, growing as a weed, 685 m, 30° 20.9213′N, 78°01.062′E, partly shady places, 14 Mar 2020, *P. Kumar 132718* (BSD).

*Withania somnifera* (L.) Dunal

*n* = 24, CHN. India, Chandigarh, 353 m, 30°45′N, 76°46′E (introduced and collected in Botanic Garden, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 01 Jul 2020, *P. Kumar 132703* (BSD).

**THELYPTERIDACEAE**

*Christella papilio* (C.Hope) K.Iwats.

*n* = 36, CHN. India, Uttarakhand, Pithoragarh, Thalkedar, Toli Village, moist shady places, 28 Aug 2019, *B.S. Kholia 126259* (BSD).

#### ZINGIBERACEAE

*Hedychium flavum* Roxb.

*n* = 17, CHN. India, Meghalaya, Shillong, 1450 m, 25°34.7344′ N, 91°53.9423′E, moist shady places (introduced and collected in Botanic Garden, Zingiber Section, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 20 Sep 2020, *P. Kumar 132728* (BSD).

***Kaempferia parviflora* Wall. ex Baker

*n* = 11, CHN. India, Meghalaya, Shillong, 1450 m, 25°34.7344′ N, 91°53.9423′E, moist shady places (introduced and collected in Botanic Garden, Zingiber Section, Botanical Survey of India, Northern Regional Centre, Dehradun, Uttarakhand), 05 May 2020, *P. Kumar 132706* (BSD).

## IAPT chromosome data 37/4

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Methods for chromosome counts follow Guerra & Souza (2002).

* First chromosome count for the species in Mexico.

§ The chromosome numbers reported here are similar to those reported by other authors (Morawetz, 1986; Maas & al., 1992).

#### ANNONACEAE

*Annona mucosa* Jacq.

* § 2*n* = 42, CHN. Mexico, Veracruz, San Andrés Tuxtla, 18° 35′05″N, 95°04′30″W, 20 Apr 2013, *Guillermo Ibarra Manríquez 6465* (MO) [Fig. 4].

The Annonaceae includes 107 genera (Guo & al., 2017), with 2400 species, many of which occur in Amazonia (Maas & al., 2015; Guo & al., 2017). Within the family, the genus *Annona* L. stands out for the many species with edible fruit, such as *A. mucosa* Jacq. (Larranaga & al., 2019; Araujo & al., 2021). The monophyly of the genus *Annona* depended on the inclusion of the genus *Rollinia* A.St.-Hil. (Rainer, 2007; Chatrou & al., 2009), whose flowers differ from the other species of *Annona* (Maas & al., 1992).

The genus *Annona* has a basic chromosome number of $x = 7$ (Morawetz, 1986). *Annona mucosa* has two ploidy levels: $2n = 4x = 28$ in probably wild populations in Peru (Maas & al., 1992) and $2n = 6x = 42$ in domesticated populations in Brazil (Morawetz, 1986; Lorenzoni, 2016). The species also appears to be

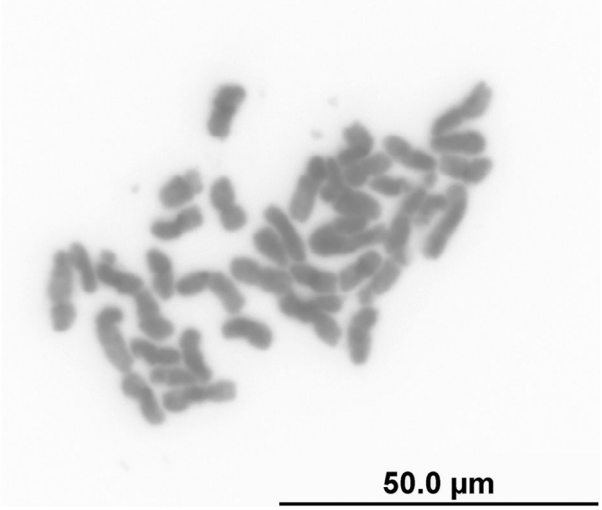


**Fig. 4.** *Annona mucosa*, 2*n* = 42.

variable in genome size (2C = 4.77, 5.42 and 6.00 pg) (Soares & al., 2014; Lorenzoni, 2016; Leitch & al., 2019). Recent studies identified wild populations of *A. mucosa* in Mexico (Segura & al., 2018; Escobedo-López & al., 2019).

We expected wild populations to present lower ploidy than cultivated populations. However, our results show that this Mexican population is hexaploid. The chromosome numbers were determined for the first time for this species in Mexico and suggest that this population may once have been cultivated.

#### LITERATURE CITED

**Araujo, N.M.P., Arruda, H.S., Marques, D.R.P., de Oliveira, W.Q., Pereira, G.A. & Pastore, G.M.** 2021. Functional and nutritional properties of selected Amazon fruits: A review. *Food Res. Int*. 147: 110520. https://doi.org/10.1016/j.foodres.2021.110520

**Chatrou, L.W., Escribano, M.P., Viruel, M.A., Maas, J.W., Richardson, J.E. & Hormaza, J.I.** 2009. Flanking regions of monomorphic microsatellite loci provide a new source of data for plant species-level phylogenetics. *Molec. Phylogen. Evol*. 53: 726–733. https://doi.org/10.1016/j.ympev.2009.07.024

**Escobedo-López, D., Campos-Rojas, E., Rodríguez-Núñez, J.R., Alia-Tejacal, I. & Núñez-Colín, C.A.** 2019. Priority areas to collect germplasm of *Annona* (Annonaceae) in Mexico based on diversity and species richness indices. *Genet. Resources Crop Evol*. 66: 401–413. https://doi.org/10.1007/s10722-018-0718-2

**Guerra, M.D. & Souza, M.J.** 2002. *Como observar cromossomos*. Ribeirão Preto: FUNPEC.

**Guo, X., Tang, C.C., Thomas, D.C., Couvreur, T.L.P. & Saunders, R.M.K.** 2017. A mega-phylogeny of the Annonaceae: Taxonomic placement of five enigmatic genera and support for a new tribe, Phoenicantheae. *Sci. Rep*. 7: 7323. https://doi.org/10.1038/s41598-017-07252-2

**Larranaga, N., Albertazzi, F.J. & Hormaza, J.I.** 2019. Phylogenetics of *Annona cherimola* (Annonaceae) and some of its closest relatives. *J. Syst. Evol*. 57: 211–221. https://doi.org/10.1111/jse.12473

**Leitch, I.J., Johnston, E., Pellicer, J., Hidalgo, O. & Bennett, M.D.** 2019. Plant DNA C-values database. Release 7.1, April

2019. Royal Botanical Gardens, Kew. https://cvalues.science.kew.org/ (accessed 20 Oct 2022).

**Lorenzoni, R.M.** 2016. *Evidências cariotípicas e moleculares da hexaploidia em Annona mucosa*. Master's thesis. Federal University of Espírito Santo, Alegre, Espírito Santo, Brazil.

**Maas, P., Lobão, A.Q. & Rainer, H.** 2015. Annonaceae. In: Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. http://floradobrasil2015.jbrj.gov.br/jabot/floradobrasil/FB110219 (accessed 20 Oct 2022).

**Maas, P.J.M., Westra, L.Y.T., Brown, K.S., Jr., Ter Welle, B.J.H., Webber, A.C., Thomas, A.L., Waha, M., Van der Heijden, E., Bouman, F., Cavé, A., Leboeuf, M., Laprévote, O., Koek-Noorman, J., Morawetz, W. & Hemmer, W.** 1992. *Rollinia*. Flora Neotropica Monograph 57. New York: New York Botanical Garden Press. https://www.jstor.org/stable/pdf/4393831

**Morawetz, W.** 1986. Systematics and karyoevolution in Magnoliidae: *Tetrameranthus* as compared with other Annonaceae genera of the same chromosome number. *Pl. Syst. Evol*. 154: 147–173. https://doi.org/10.1007/BF00984875

**Rainer, H.** 2007. Monographic studies in the genus *Annona* L. (Annonaceae): Inclusion of the genus *Rollinia* A. St.-Hil. *Ann. Naturhist. Mus. Wien B* 108: 191–205.

**Segura, S., Fresnedo, J., Mathuriau, C., López, J., Andrés, J. & Muratalla, A.** 2018. The edible fruit species in Mexico. *Genet. Resources Crop Evol*. 65: 1767–1793. https://doi.org/10.1007/s10722-018-0652-3

**Soares, J.D.R., Dias, G. de M.G., Rodrigues, F.A., Pasqual, M. & Chagas, E.A.** 2014. Caracterização anatômica e citométrica embiribazeiro (*Rollinia mucosa* [Jacq.]). *Revista Bras. Frutic*. 36(ed. espec.): 272–280. https://doi.org/10.1590/S0100-29452014000500032

## IAPT chromosome data 37/5

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### METHODS

Absolute genome sizes (hereafter PI FCM) expressed in picograms (pg) of DNA and/or relative genome sizes (DAPI FCM) expressed in relative fluorescence intensities of a sample compared to the standard were estimated by flow cytometry by P. Mered'a Jr. at the Institute of Botany PSBC SAS in Bratislava. The analyses were performed on fresh leaves collected in the field and stored for up to 10 days at 4°C–10°C in plastic bags with a small amount of water. The sample preparation and FCM procedure followed that of Mered'a & al. (2019). The relationship between genome size (absolute or relative) and ploidy level was established using reference plants with known chromosome counts (cf. Mered'a & al., in prep.).

PI FCM. Intercalating propidium iodide (PI) was used. As an internal reference standard, *Zea mays* 'CE-777' (2C = 5.43 pg; Lysák & Doležel, 1998) was used. The coefficient of variation (CV) up to 5% was accepted.

DAPI FCM. Base-specific 4′,6-diamidino-2-phenylindole (DAPI) was used. As an internal reference standard, *Bellis perennis* L. (2C = 3.38 pg; Schönswetter & al., 2007) was used. The relative genome size is given in arbitrary units relative to the used standard (a.u.; this value is equivalent to the ratio of mean fluorescence intensities of the sample and the standard). A CV up to 3.5% was accepted.

* Population previously analysed by Mandák & al. (2003) and Suda & al. (2010).

### POLYGONACEAE

*Fallopia baldschuanica* (Regel) Holub

The CVs of samples and internal standard ranged from 3.59% to 3.93% (mean 3.76%) and from 3.03% to 3.11% (mean 3.07%), respectively.

$2n \sim 2x \sim 20$, 2C = 3.176–3.201 pg, PI FCM. Slovak Republic, Bratislava Region, Bratislava-Staré Mesto borough, 48°08′35″N, 17°05′37″E, 194 m, 27 Jun 2019, *P. Mered'a, Jr. 126-1A* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′08″N, 17°01′30″E, 173 m, 27 Jun 2019, *P. Mered'a, Jr. 123* (SAV).

*Fallopia ×bohemica* (Chrtek & Chrtková) J.P.Bailey

The CVs of samples and internal standard in PI FCM ranged from 1.64% to 3.85% (mean 2.62%) and from 2% to 4.52% (mean 2.92%), respectively. The CVs of samples and internal standard in DAPI FCM ranged from 1.61% to 2.91% (mean 2.19%) and from 1.96% to 3.32% (mean 2.63%), respectively.

$2n \sim 6x \sim 66$, 2C = 6.758–7.010 pg, PI FCM. Slovak Republic, Banská Bystrica Region, Čabradský Vrbovok village, 48°15′27″N, 19°04′41″E, 319 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1058* (SAV); Slovak Republic, Banská Bystrica Region, Čabradský Vrbovok village, 48°15′33″N, 19°04′22″E, 315 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1059* (SAV); Slovak Republic, Banská Bystrica Region, Domaníky village, 48°15′51″N, 18°59′28″E, 191 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1061* (SAV); Slovak Republic, Banská Bystrica Region, Domaníky village, 48°15′50″N, 18°59′29″E, 191 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1062* (SAV); Slovak Republic, Banská Bystrica Region, Drienovo village, 48°13′38″N, 19°03′42″E, 369 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1055* (SAV); Slovak Republic, Banská Bystrica Region, Drienovo village, 48°13′46″N, 19°03′49″E, 361 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1056* (SAV); Slovak Republic, Banská Bystrica Region, Drienovo village, 48°13′45″N, 19°03′49″E, 360 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1057* (SAV); Slovak Republic, Banská Bystrica Region, Drienovo village, 48°13′52″N, 19°03′49″E, 368 m, 25 Oct 2017, *S. Botlová 1072* (SAV); Slovak Republic, Banská Bystrica Region, Jalšovík village, 48°18′29″N, 19°06′14″E, 345 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1060* (SAV); Slovak Republic, Banská Bystrica Region, Rykynčice village, 48°12′13″N, 18°58′10″E, 156 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1063* (SAV); Slovak Republic, Banská Bystrica Region, Rykynčice village, 48°11′36″N, 18°58′11″E, 156 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1064* (SAV); Slovak Republic, Bratislava Region, Bratislava-Bory borough, 48°12′12″N, 17°01′54″E, 185 m, 04 Sep 2016, *P. Mered'a, Jr. 61* (SAV); Slovak Republic, Bratislava Region, Bratislava city, Vydrica valley, 48°11′18″N, 17°04′45″E, 222 m, 16 Sep 2016, *P. Mered'a, Jr. 70B* (SAV); Slovak Republic, Bratislava Region, Bratislava city, Vydrica valley, 48°11′50″N, 17°06′00″E, 263 m, 16 Sep 2016, *P. Mered'a, Jr. 74* (SAV); Slovak Republic, Bratislava Region, Bratislava-Karlova Ves borough, 48°10′

21″N, 17°04′09″E, 190 m, 30 Aug 2016, *P. Mered'a, Jr. 51-1* (SAV), *P. Mered'a, Jr. 51-2* (SAV), *P. Mered'a, Jr. 51-3* (SAV); Slovak Republic, Bratislava Region, Bratislava-Lamač borough, 48°11′02″N, 17°03′05″E, 205 m, 14 Oct 2016, *P. Mered'a, Jr. 52* (SAV); Slovak Republic, Bratislava Region, Bratislava-Lamač borough, 48°11′06″ N, 17°02′54″E, 204 m, 14 Oct 2016, *P. Mered'a, Jr. 59* (SAV); Slovak Republic, Bratislava Region, Bratislava-Lamač borough, 48°11′09″N, 17°02′52″E, 205 m, 14 Oct 2016, *P. Mered'a, Jr. 64* (SAV); Slovak Republic, Bratislava Region, Bratislava-Lamač borough, 48°11′14″ N, 17°02′51″E, 208 m, 14 Oct 2016, *P. Mered'a, Jr. 78* (SAV); Slovak Republic, Bratislava Region, Bratislava-Lamač borough, 48°11′10″N, 17°03′39″E, 252 m, 16 Sep 2016, *P. Mered'a, Jr. 82* (SAV); Slovak Republic, Bratislava Region, Marianka village, 48°15′13″N, 17°03′ 08″E, 204 m, 14 Oct 2016, *P. Mered'a, Jr. 102* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′32″N, 17°02′06″E, 201 m, 03 Sep 2016, *P. Mered'a, Jr. 53B* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′09″N, 17°01′23″E, 173 m, 04 Sep 2016, *P. Mered'a, Jr. 56* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′38″N, 17°02′29″E, 187 m, 09 Sep 2016, *P. Mered'a, Jr. 57-1* (SAV), *P. Mered'a, Jr. 57-2* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′34″N, 17°02′10″E, 183 m, 09 Sep 2016, *P. Mered'a, Jr. 58* (SAV); Slovak Republic, Nitra Region, E of Plášťovce village, 48°09′42″N, 19°00′15, 155 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1065* (SAV); Slovak Republic, Nitra Region, Plášťovce village, 48°09′23″N, 18°58′08, 142 m, 29 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1066* (SAV).

$2n \sim 6x \sim 66$, 2C = 1.850–1.886 a.u., DAPI FCM. Austria, Carinthia, Klagenfurt am Wörthersee city, 46°38′26.4″N, 14°22′12.9″E, 433 m, 30 Jun 2021, *K. Skokanová & S. Španiel 280* (SAV); Austria, Carinthia, Köttmannsdorf town, 46°34′32.3″N, 14°13′21.7″E, 755 m, 30 Jun 2021, *K. Skokanová & S. Španiel 282* (SAV); Austria, Carinthia, Maria Rain town, 46°33′52.7″N, 14°17′32.0″E, 547 m, 30 Jun 2021, *K. Skokanová & S. Španiel 281* (SAV); Austria, Lower Austria, Puchberg am Schneeberg town, Ödenhof village, 47°46′13.9″N, 15°56′09.1″E, 526 m, 02 Jul 2021, *K. Skokanová & S. Španiel 283* (SAV). Croatia, Lika-Senj County, Ličko Lešće village, Tonkovićevo vrilo spring, 44°47′21.81″N, 15° 22′04.64″E, 459 m, 02 Jul 2020, *K. Skokanová & S. Španiel 160* (SAV); Croatia, Međimurje County, Čukovec village, 46°20′36.5″ N, 16°41′38.0″E, 150 m, 03 Jul 2020, *K. Skokanová & S. Španiel 164* (SAV); Croatia, Požega-Slavonia County, S of Požega town, 45°18′16.6″N, 17°39′48.9″E, 217 m, 02 Jul 2020, *K. Skokanová & S. Španiel 161* (SAV). Czech Republic, Olomouc Region, Dolní Újezd village, 49°32′37″N, 17°32′35″E, 273 m, 21 Sept 2021, *K. Skokanová & S. Španiel 490* (SAV). Czech Republic, South Moravian Region, Luleč village, 49°15′06″N, 16°55′20″E, 303 m, 01 Oct 2021, *I. Hodálová 499* (SAV). Hungary, Vas County, Vasvár town, 47°03′20.4″N, 16°47′26.2″E, 169 m, 03 Jul 2020, *K. Skokanová & S. Španiel 167* (SAV); Hungary, Zala County, Zalaegerszeg town, 46°50′28.8″N, 16°51′54.5″E, 139 m, 03 Jul 2020, *K. Skokanová & S. Španiel 166* (SAV); Hungary, Zala County, Zalaszentbalázs village, 46°35′38.8″N, 16°55′02.1″E, 171 m, 03 Jul 2020, *K. Skokanová & S. Španiel 165-1* (SAV), *K. Skokanová & S. Španiel 165-2* (SAV). Romania, Braşov County, Teliu town, 45°42′15.0″N, 25°50′38.6″E, 528 m, 16 Jun 2021, *K. Skokanová 275* (SAV); Romania, Neamţ County, Cândeşti village, 46°43′24.1″N, 26°35′08.6″E, 248 m, 12 Jun 2021, *K. Skokanová 276* (SAV).

$2n \sim 8x \sim 88$, 2C = 8.931–9.103 pg, PI FCM. *Czech Republic, Central Bohemian Region, Loučeň town, 50°17′10″N, 15°01′30″E, 240 m, 26 Sep 2017, *P. Mered'a, Jr. 107-1* (SAV), *P. Mered'a, Jr. 107-2* (SAV); Czech Republic, Central Bohemian Region, Luštěnice village, 50°19′14″N, 14°56′39″E, 207 m, 26 Sep 2017, *P. Mered'a, Jr. 112* (SAV); *Czech Republic, Plzeň Region, Bezdružice town, 49°55′01″N, 12°59′05″E, 508 m, 27 Sep 2017, *P. Mered'a, Jr. 116-1* (SAV), *P. Mered'a, Jr. 116-2* (SAV).

$2n \sim 8x \sim 88$, 2C = 2.408–2.530 a.u., DAPI FCM. Czech Republic, Central Bohemian Region, Loučeň town, 50°17′10″N, 15°01′30″E, 240 m, 25 Sep 2017, *P. Mered'a, Jr. 106* (SAV); *-Czech Republic, Central Bohemian Region, Loučeň town, 50°17′ 10″N, 15°01′30″E, 240 m, 26 Sep 2017, *P. Mered'a, Jr. 107-2* (SAV); Czech Republic, Central Bohemian Region, Luštěnice village, 50°19′14″N, 14°56′39″E, 207 m, 26 Sep 2017, *P. Mered'a, Jr. 112* (SAV); *Czech Republic, Plzeň Region, Bezdružice town, 49°55′01″N, 12°59′05″E, 508 m, 27 Sep 2017, *P. Mered'a, Jr. 116-2* (SAV).

*Fallopia dumetorum* (L.) Holub

The CVs of sample and internal standard were 3.81% and 3.18%, respectively.

$2n \sim 2x \sim 20$, 2C = 1.521 pg, PI FCM. Slovak Republic, Bratislava Region, Bratislava-Staré Mesto borough, 48°08′43″N, 17°05′38″E, 226 m, 27 Jun 2019, *P. Mered'a, Jr. 127-1* (SAV).

*Fallopia japonica* (Houtt.) Ronse Decr. var. *japonica*

The CVs of samples and internal standard in PI FCM ranged from 1.69% to 3.52% (mean 2.65%) and from 2.25% to 4.09% (mean 3.04%), respectively. The CVs of samples and internal standard in DAPI FCM ranged from 1.62% to 2.32% (mean 1.94%) and from 2.27% to 3.07% (mean 2.58%), respectively.

$2n \sim 8x \sim 88$, 2C = 9.339–9.663 pg, PI FCM. Czech Republic, Central Bohemian Region, Mělník town, 50°22′06″N, 14°28′21″E, 167 m, 26 Sep 2017, *P. Mered'a, Jr. 114-1* (SAV), *P. Mered'a, Jr. 114-2* (SAV). Slovak Republic, Banská Bystrica Region, S of Čabradský Vrbovok village, 48°13′48″N, 19°04′37″E, 223 m, 25 Oct 2017, *S. Botlová 1054* (SAV); Slovak Republic, Banská Bystrica Region, SE of Čabradský Vrbovok village, 48°14′35″N, 19° 06′32″E, 250 m, 25 Oct 2017, *S. Botlová 1070* (SAV); Slovak Republic, Banská Bystrica Region, SE of Čabradský Vrbovok village, 48°14′44″N, 19°06′09″E, 249 m, 25 Oct 2017, *S. Botlová 1071* (SAV); Slovak Republic, Banská Bystrica Region, SW of Drienovo village, 48°11′44″N, 19°02′27″E, 188 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1041* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°12′42″N, 19°03′27″E, 205 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1042* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°12′53″ N, 19°03′45″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1043* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°12′54″N, 19°03′52″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1044* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°12′59″N, 19°03′55″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1045* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°13′03″N, 19°03′56″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1046* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°13′07″N, 19°03′59″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1047* (SAV); Slovak Republic, Banská Bystrica Region, S of Drienovo village, 48°13′08″ N, 19°04′01″E, 210 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1048* (SAV); Slovak Republic, Banská Bystrica Region, E of Drienovo village, 48°13′37″N, 19°04′21″E, 220 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1049* (SAV); Slovak Republic, Banská

Bystrica Region, E of Drienovo village, 48°13′39″N, 19°04′24″E, 221 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1050* (SAV); Slovak Republic, Banská Bystrica Region, SE of Drienovo village, 48°13′23″N, 19°04′17″E, 218 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1051* (SAV); Slovak Republic, Banská Bystrica Region, E of Drienovo village, 48°13′35″N, 19°04′19″E, 220 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1052* (SAV); Slovak Republic, Banská Bystrica Region, E of Drienovo village, 48°13′39″N, 19°04′25″E, 221 m, 28 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1053* (SAV); Slovak Republic, Bratislava Region, Bratislava city, Vydrica valley, 48°11′18″N, 17°04′45″E, 222 m, 16 Sep 2016, *P. Mered'a, Jr. 70J* (SAV); Slovak Republic, Bratislava Region, Bratislava city, Vydrica valley, 48°11′31″N, 17°04′50″E, 240 m, 16 Sep 2016, *P. Mered'a, Jr. 75* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′32″N, 17°02′06″E, 201 m, 03 Sep 2016, *P. Mered'a, Jr. 53J-1* (SAV); Slovak Republic, Bratislava Region, Stupava town, 48°16′11″N, 17°01′25″E, 173 m, 04 Sep 2016, *P. Mered'a, Jr. 55-1* (SAV); Slovak Republic, Trenčín Region, Ilava town, 48°59′22″N, 18°14′48″E, 270 m, 29 Aug 2016, *P. Mered'a, Jr. 50* (SAV).

2*n* ~ 8*x* ~ 88, 2C = 2.547–2.589 a.u., DAPI FCM. Austria, Carinthia, Ferlach town, 46°30′55.8″N, 14°17′43.0″E, 490 m, 01 Jul 2021, *K. Skokanová & S. Španiel 288* (SAV). Croatia, Koprivnica-Križevci County, Kloštar Podravski settlement, 46°00′04.3″N, 17°10′09.1″E, 118 m, 03 Jul 2020, *K. Skokanová & S. Španiel 163* (SAV); Croatia, Virovitica-Podravina County, Donji Meljani village, 45°43′25.7″N, 17°38′25.9″E, 122 m, 02 Jul 2020, *K. Skokanová & S. Španiel 162* (SAV); Czech Republic, Central Bohemian Region, Mělník town, 50°22′06″N, 14°28′21″E, 167 m, 26 Sep 2017, *P. Mered'a, Jr. 114-2* (SAV). Poland, Opole Voivodeship, Krapkowice town, 50°28′25″N, 17°58′08″E, 167 m, 21 Sep 2021, *K. Skokanová & S. Španiel 491J* (SAV). Romania, Hunedoara County, Govăjdia village, 45°44′07.7″N, 22°48′07.2″E, 423 m, 08 Jun 2021, *K. Skokanová 274* (SAV); Romania, Hunedoara County, Lelese village, 45°44′05.2″N, 22°41′51.3″E, 771 m, 08 Jun 2021, *K. Skokanová 273* (SAV).

*Fallopia sachalinensis* (F.Schmidt) Ronse Decr.

The CVs of samples and internal standard in PI FCM ranged from 1.8% to 3.91% (mean 2.57%) and from 1.85% to 4.7% (mean 2.75%), respectively. The CVs of samples and internal standard in DAPI FCM ranged from 1.61% to 2.5% (mean 1.97%) and from 2.04% to 3% (mean 2.35%), respectively.

2*n* ~ 4*x* ~ 44, 2C = 4.175–4.219 pg, PI FCM. Slovak Republic, Bratislava Region, W of Stupava town, 48°16′11″N, 16°59′11″E, 161 m, 31 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1067* (SAV); Slovak Republic, Bratislava Region, W of Stupava town, 48°16′07″N, 16°57′39″E, 153 m, 31 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1068* (SAV); Slovak Republic, Bratislava Region, W of Stupava town, 48°16′09″N, 16°57′42″E, 151 m, 31 Aug 2017, *S. Botlová & P. Mered'a, Jr. 1069* (SAV).

2*n* ~ 4*x* ~ 44, 2C = 1.141–1.157 a.u., DAPI FCM. Austria, Carinthia, Laak village, 46°32′23.0″N, 14°21′56.3″E, 422 m, 01 Jul 2021, *K. Skokanová & S. Španiel 287* (SAV). Poland, Opole Voivodeship, Krapkowice town, 50°28′25″N, 17°58′08″E, 167 m, 21 Sep 2021, *K. Skokanová & S. Španiel 491S* (SAV).

2*n* ~ 8*x* ~ 88, 2C = 8.558–8.790 pg, PI FCM. Czech Republic, Central Bohemian Region, Loučeň town, 50°16′55″N, 15°01′04″E, 257 m, 25 Sep 2017, *P. Mered'a, Jr. 103-1* (SAV), *P. Mered'a, Jr. 103-2* (SAV); *Czech Republic, Central Bohemian Region, Loučeň town, 50°17′05″N, 15°01′14″E, 256 m, 25 Sep 2017, *P. Mered'a, Jr. 104* (SAV); Czech Republic, Central Bohemian Region, Loučeň town, 50°17′15″N, 15°01′30″E, 258 m, 25 Sep 2017, *P. Mered'a, Jr. 105* (SAV); *Czech Republic, Central Bohemian Region, Loučeň town, 50°17′18″N, 15°01′35″E, 249 m, 26 Sep 2017, *P. Mered'a, Jr. 108* (SAV); Czech Republic, Central Bohemian Region, Loučeň town, 50°17′29″N, 15°01′41″E, 263 m, 26 Sep 2017, *P. Mered'a, Jr. 109* (SAV); *Czech Republic, Central Bohemian Region, Luštěnice village, 50°19′17″N, 14°56′28″E, 206 m, 26 Sep 2017, *P. Mered'a, Jr. 113* (SAV); *Czech Republic, Central Bohemian Region, Újezd village, 50°18′31″N, 14°57′06″E, 208 m, 25 Sep 2017, *P. Mered'a, Jr. 110* (SAV); *Czech Republic, Central Bohemian Region, Újezd village, 50°18′39″N, 14°57′02″E, 204 m, 25 Sep 2017, *P. Mered'a, Jr. 111* (SAV).

2*n* ~ 8*x* ~ 88, 2C = 2.346–2.373 a.u., DAPI FCM. Czech Republic, Central Bohemian Region, Loučeň town, 50°16′55″N, 15°01′04″E, 257 m, 25 Sep 2017, *P. Mered'a, Jr. 103-2* (SAV); *Czech Republic, Central Bohemian Region, Loučeň town, 50°17′05″N, 15°01′14″E, 256 m, 25 Sep 2017, *P. Mered'a, Jr. 104* (SAV); Czech Republic, Central Bohemian Region, Loučeň town, 50°17′15″N, 15°01′30″E, 258 m, 25 Sep 2017, *P. Mered'a, Jr. 105* (SAV); *Czech Republic, Central Bohemian Region, Loučeň town, 50°17′18″N, 15°01′35″E, 249 m, 26 Sep 2017, *P. Mered'a, Jr. 108* (SAV); Czech Republic, Central Bohemian Region, Loučeň town, 50°17′29″N, 15°01′41″E, 263 m, 26 Sep 2017, *P. Mered'a, Jr. 109* (SAV); *Czech Republic, Central Bohemian Region, Luštěnice village, 50°19′17″N, 14°56′28″E, 206 m, 26 Sep 2017, *P. Mered'a, Jr. 113* (SAV); *Czech Republic, Central Bohemian Region, Újezd village, 50°18′31″N, 14°57′06″E, 208 m, 25 Sep 2017, *P. Mered'a, Jr. 110* (SAV); *Czech Republic, Central Bohemian Region, Újezd village, 50°18′39″N, 14°57′02″E, 204 m, 25 Sep 2017, *P. Mered'a, Jr. 111* (SAV).

## LITERATURE CITED

**Lysák, M.A. & Doležel, J.** 1998. Estimation of nuclear DNA content in *Sesleria* (Poaceae). *Caryologia* 51: 123–132. https://doi.org/10.1080/00087114.1998.10589127

**Mandák, B., Pyšek, P., Lysák, M., Suda, J., Krahulcová, A. & Bímová, K.** 2003. Variation in DNA-ploidy levels of *Reynoutria* taxa in the Czech Republic. *Ann. Bot. (Oxford)* 92: 265–272. https://doi.org/10.1093/aob/mcg141

**Mered'a, P., Jr., Kolárikova, Z. & Hodálová, I.** 2019. Cytological and morphological variation of *Fallopia* sect. *Reynoutria* taxa (Polygonaceae) in the Krivánska Malá Fatra Mountains (Slovakia). *Biologia (Bratislava)* 74: 215–236. https://doi.org/10.2478/s11756-018-00168-w

**Schönswetter, P., Suda, J., Popp, M., Weiss-Schneeweiss, H. & Brochmann, C.** 2007. Circumpolar phylogeography of *Juncus biglumis* (Juncaceae) inferred from AFLP fingerprints, cpDNA sequences, nuclear DNA content and chromosome numbers. *Molec Phylogen. Evol.* 42: 92–103. https://doi.org/10.1016/j.ympev.2006.06.016

**Suda, J., Trávníček, P., Mandák, B. & Berchová-Bímová, K.** 2010. Genome size as a marker for identifying the invasive alien taxa in *Fallopia* section *Reynoutria*. *Preslia* 82: 97–106.