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Thymus chromosome numbers from Lithuania

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Abstract: The present study gives the chromosome numbers of two species of the genus *Thymus* L. and their hybrid occurring in Lithuania: *Thymus serpyllum* L. 2n=24, *T. pulegioides* L. 2n=28 and *T.* x *oblongifolius* OPIZ 2n=26. Both species and the hybrid had one or two supernumerary B-chromosomes. Two chromosomes in some investigated *T. pulegioides* plants had unstable satellites. The chromosome number 2n=56 observed in some *T. pulegioides* seedlings demonstrate proper polyploidization in this species.

Keywords: *Thymus*, karyology, Lithuania.

Introduction

Two *Thymus* species occur in Lithuania – *Thymus pulegioides* L. and *Thymus serpyllum* L. Karyology studies indicate that *Thymus serpyllum* has the chromosome number 2n = 24 (JALAS 1948, JALAS & POHJO 1965, TRELA-SAWICKA 1968, PIGOTT 1954, GOGINA 1990, MÁRTONFI 1996), *T. pulegioides* – 2n = 28 (JALAS 1948, JALAS & POHJO 1965, JALAS & KALEVA 1966, 1967, TRELA-SAWICKA 1968, 1970, PIGOTT 1954, SHIMOYA 1952, CAMPO & ROMANO 1995, GOGINA 1990, MÁRTONFI 1996).

Cross-pollination is known to be a frequent phenomenon for species in the genus *Thymus* (GOGINA 1990, THOMPSON et al. 1998), therefore many interspecific hybrids of natural origin were found (SOÓ 1970, SCHMIDT 1977, SALGUEIRO et al. 1993, MATEO & CRESPO 1997). One of the interspecific hybrids is also known in Lithuania – *T.* x *oblongifolius* OPIZ (*T. pulegioides* L. x *T. serpyllum* L.) (LEKAVIČIUS & JASKONIS 1969). The hybrid *T.* x *oblongifolius* was found in Sipoo (South Finland) (JALAS 1947) and had 2n=26 in the root tips of mature plants (JALAS & KALEVA 1967). *T. serpyllum* does not grow in Sipoo, therefore JALAS (1947) supposes that *T.* x *oblongifolius* was probably transported from Turku where this

species grows in natural habitats (HYLANDER 1948). In Lithuania *T.* x *oblongifolius* is usually found in habitats where both *T. serpyllum* and *T. pulegioides* grow together (LEKAVIČIUS & JASKONIS 1968, LOŽIENĖ & VAIČIŪNIENĖ 1999).

Material and methods

The chromosome number was determined for two plants of *T. serpyllum* subsp. *serpyllum*, ten plants of *T. pulegioides* and five plants of *T.* x *oblongifolius*. The investigated *T. pulegioides* individuals belong to subsp. *pulegioides* (5 plants) and subsp. *silvestris* (5 plants).

The chromosome numbers were determined in the clones of *T. serpyllum, T. pulegioides* and *T.* x *oblongifolius*, growing in the field collection of the Institute of Botany (Lithuania). The investigated plants of *T. serpyllum, T. pulegioides* and *T.* x *oblongifolius* were transplanted to the field collection from different 2, 7 and 5 natural habitats, respectively (Tab. 1).

Chromosomes of the clones of *T. serpyllum* and *T. pulegioides* were counted in root tip meristems of seedlings (3–4 days old). For the samples of *T. serpyllum* and *T. pulegioides* the pretreatment by 0.002 M 8-hydroxyquinoline solution during 17 hours (at the temperature of +1ºC) was used, the samples were fixed in the mixture of 96% ethanol and glacial acetic acid in the ratio 3:1. Chromosomes of the clones of *T.* x *oglongifolius* were counted in root tip meristems of mature plants. For the samples *T.* x *oglongifolius* the pretreatment by a mixture of distilled water and saturated solution of p-dichlorbenzene (1:1) during 2 hours (at the temperature of +1ºC) was used, the samples were fixed in mixture of 96% ethanol and glacial acetic acid in the ratio 3:1. After the fixation the roots of *T. serpyllum*, *T. pulegioides* and *T.* x *obglongifolius* were macerated in 60ºC warm nHCl and stained in 10% Giemsa solution in phosphate buffer.

The karyological analysis of the investigated plants was carried out at P. J. Šafárik University in Košice (Slovakia).

Results

***T. serpyllum* subsp. *serpyllum*.** 2n=24 chromosomes were counted in the *T. serpyllum* subsp. *serpyllum* (Fig. 1). One of the *T. serpyllum* subsp. *serpyllum* plants had one supernumerary B-chromosome (2n=24+B).

***T. pulegioides* subsp. *pulegioides*, *T. pulegioides* subsp. *silvestris*.** 2n=28 chromosomes were counted in *T. pulegioides* of both subspecies (Fig. 2).

Almost all investigated plants of *T. pulegioides* had one or two supernumerary B-chromosomes. TRELA-SAWICKA (1968) also mentions that in Poland *T. pulegioides* cytotype with 2n=30 was found, which should be the cytotype 2n=28 with two B-chromosomes (TRELA-SAWICKA 1972).

Two chromosomes had two satellites in one of the investigated *T. pulegioides* plant. According to TRELA-SAWICKA (1968, 1972) two chromosomes in the *T. pulegioides* cytotype 2n=28 have unstable satellites.

The roots of two seedlings of one *T. pulegioides* plant from habitat No.4 (Tab. 1) had the chromosome number 2n=56 (Fig. 3). It is the octoploid type and indicates that polyploidization is typical for this species. JALAS & POHJO (1965)

report, that cytotype of *T. pulegioides* with 56 somatic chromosomes was found in Switzerland.

T.* x *oblongifolius. 2n=26 chromosomes were counted in all five investigated *T.* x *oblongifolius* (Fig. 4). In four investigated plants of *T.* x *oblongifolius* one or two supernumerary B-chromosomes were found (Fig. 5). JALAS & KALEVA (1967) report that *T.* x *oblongifolius* has chromosome number 2n=26.

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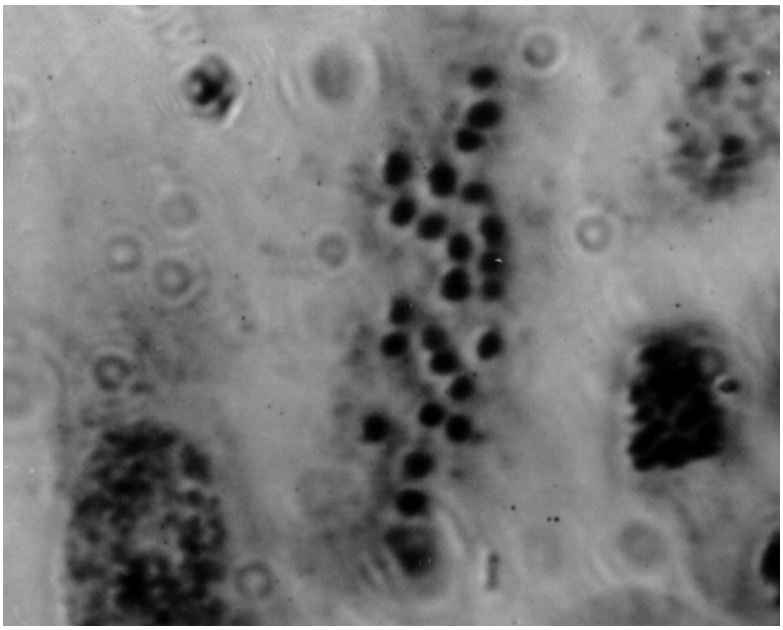
A



B

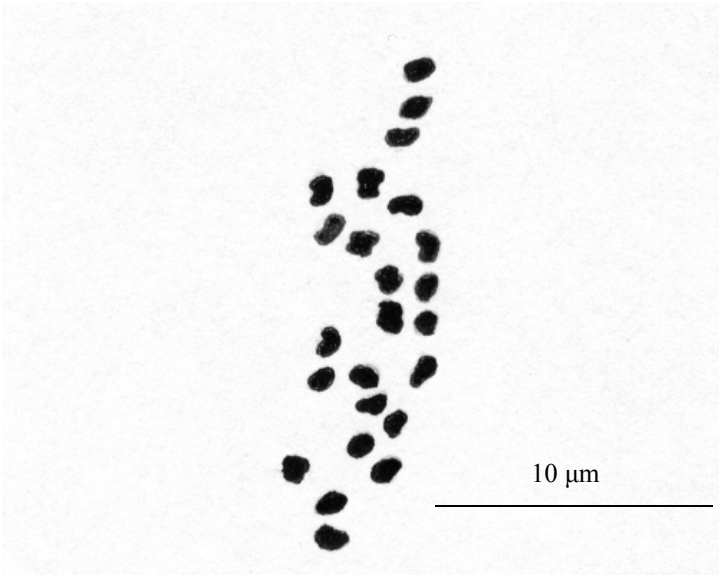
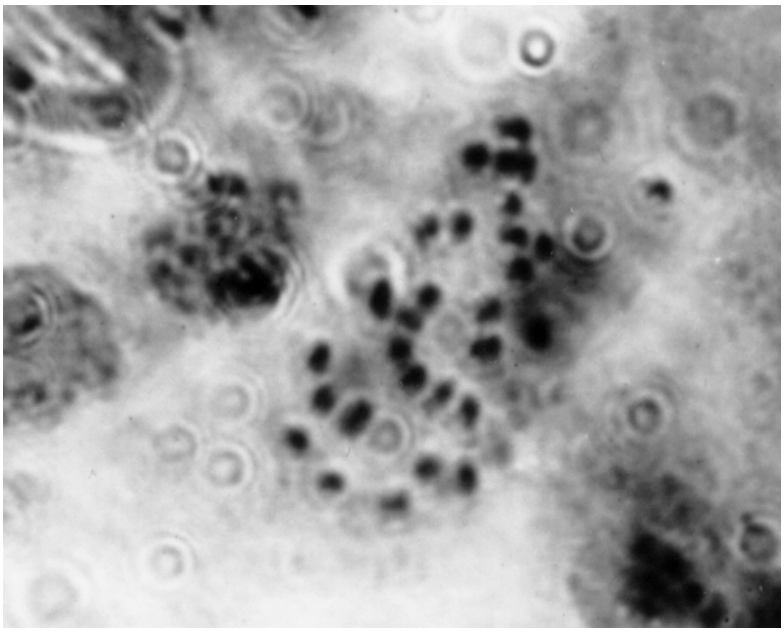


Fig. 1. Root tip metaphase plate of *Thymus serpyllum* L., 2n=24 (A – micrograph, B – picture corresponding to the micrograph)

A



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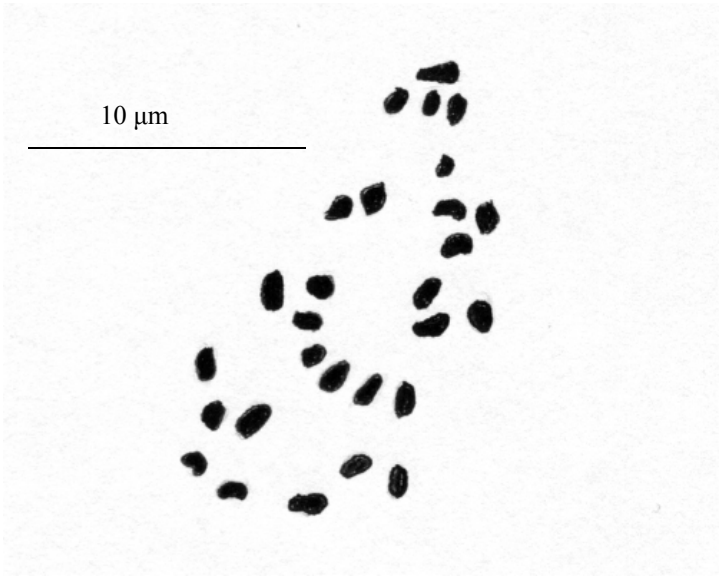


Fig. 2. Root tip metaphase plate of *Thymus pulegioides* L., 2n=28 (A – micrograph, B – picture corresponding to the micrograph)

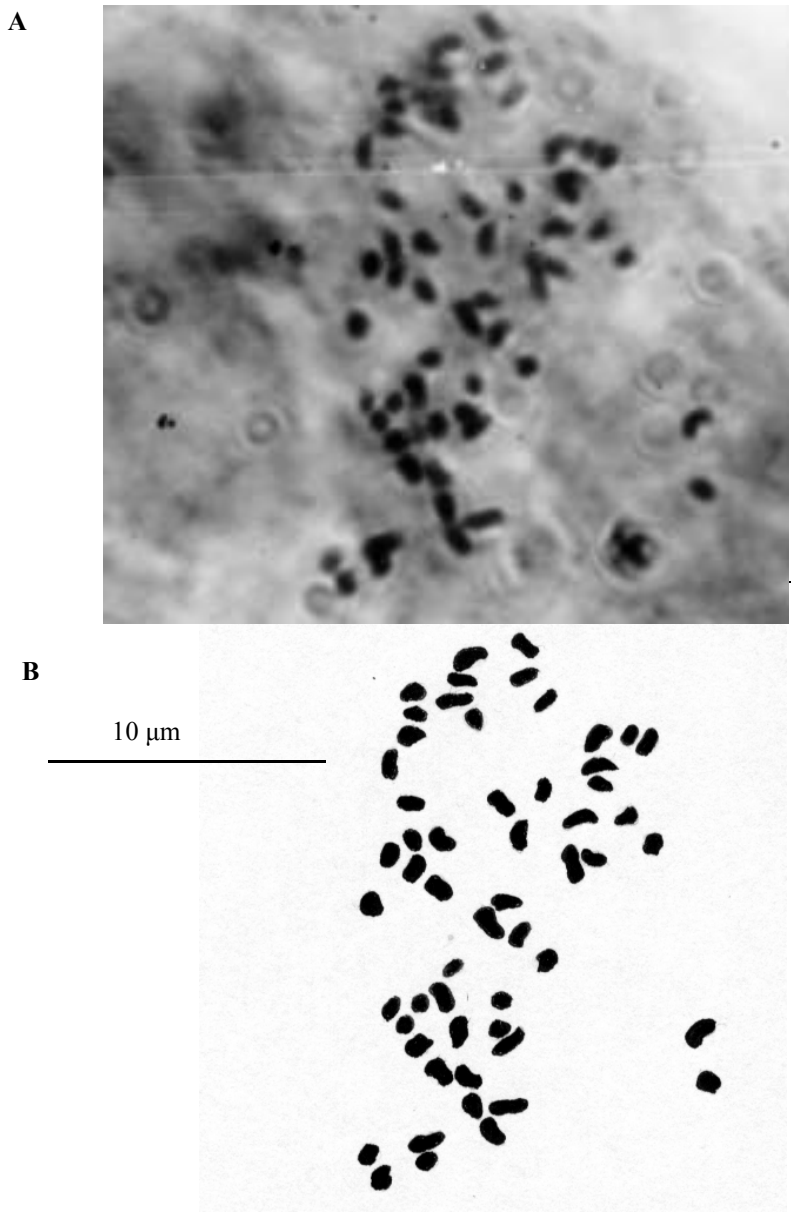
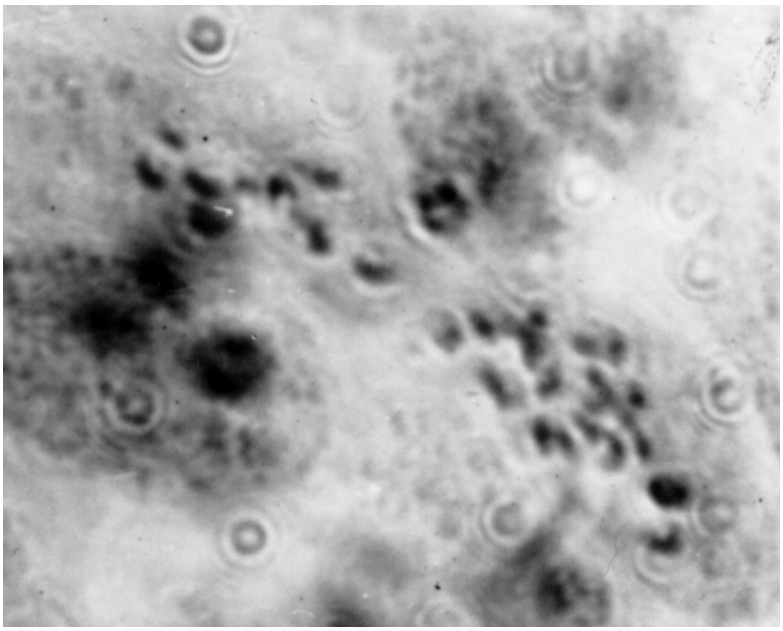


Fig. 3. Root tip metaphase plate of *Thymus pulegioides* L., 2n=56 (A – micrograph, B – picture corresponding to the micrograph)

A



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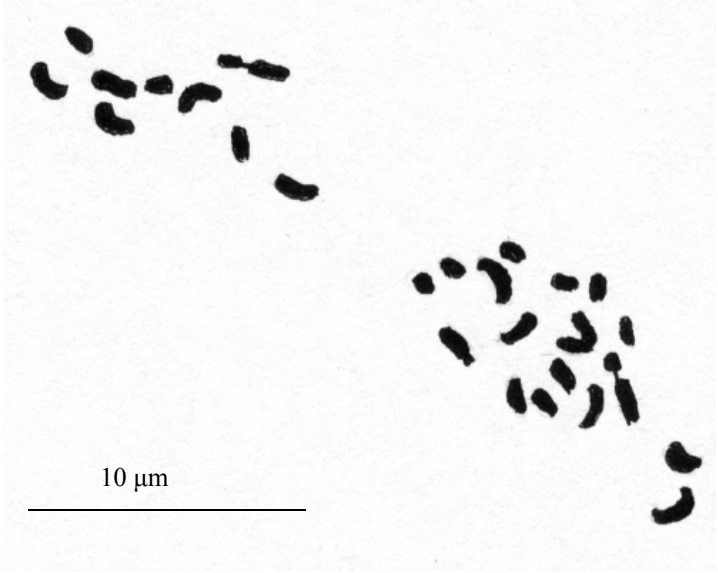
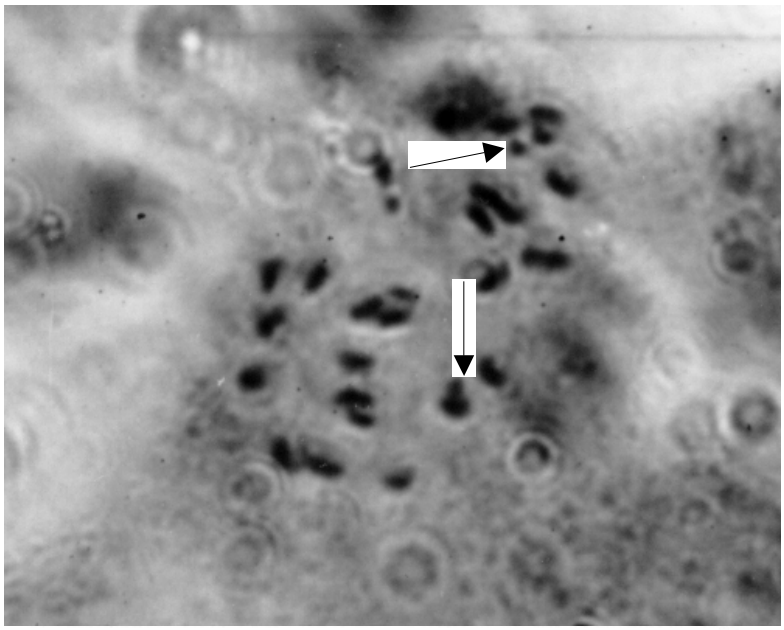


Fig. 4. Root tip metaphase plate of *Thymus* x *oblongifolius* Opiz, 2n=26 (A – micrograph, B – picture corresponding to the micrograph)

A



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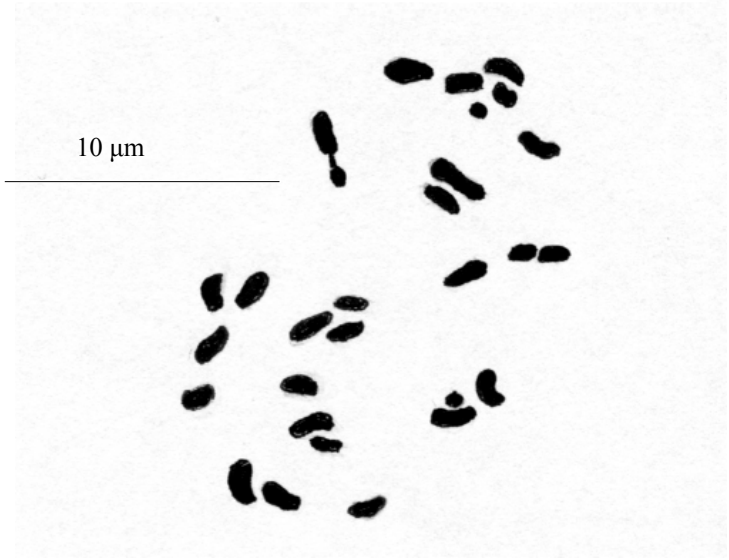

Fig. 5. Root tip metaphase plate of *Thymus x oblongifolius* Opiz, 2n=26+2B (A – micrograph, B – picture corresponding to the micrograph)

Table 1. The characteristic of habitats of investigated *Thymus* species.

No. of habit.	**Locality**	**Ecological characteristic**	**Plants association**	**Investigated plants of *Thymus* genus**
1	Vilnius, Balsiai	Forest edge, relief plain illumination 70 %	*Calluno–Nardetum strictae*	*T.* x *oblongifolius*
2	Vilnius, Rokantiškės	Slope aspects S, inclination 30°, illumination 100 %, pasture, haying	*Festucetum pratensis*	*T. pulegioides* subsp. *pulegioides* (two plants) *T.* x *oblongifolius*
3	Vilnius, Rokantiškės	Slope aspects S, inclination 45°, illumination 100 %, pasture, haying	*Arrhenatheretum elatioris*	*T. pulegioides* subsp. *pulegioides* *T. pulegioides* subsp. *silvestris*
4	Vilnius reg. Verkiai regional park	Relief undulated, illumination 100 %, pasture, haying	*Festucetum pratensis*	*T. pulegioides* subsp. *silvestris* (two plants)
5	Vilnius reg., Žalieji ežerai	Relief plain, illumination 90 %	Unformed and antropogenised	*T. pulegioides* subsp. *pulegioides*
6	Varėna reg., Pūvočiai village	Relief undulated, illumination 100 %, pasture, haying	*Pulsatillo–phleetum phleoides*	*T.* x *oblongifolius*
7	Varėnos reg., Glūkas forestry	Slope aspects S, inclination 5°, illumination 100 %, pasture, haying	*Festucetum pratensis*	*T.* x *oblongifolius*
8	Jurbarkas reg., Šilinė village	Forest edge, relief plain illumination 80 %	Unformed and antropogenised	*T.* x *oblongifolius*
9	Curonian Spit peninsula (Baltic Sea coast), Juodkrantė	Sandy plain, relief plain, illumination 100 %	*Helichryso-Jasionetum*	*T. serpyllum* subsp. *serpyllum*

10	Salčininkai reg.	Slope aspects N, inclination 15°, sandgravel–pit, illumination 100 %, pasture, haying	Unformed and antropogenised	*T. serpyllum* subsp. *serpyllum*
11	Molėtai reg., Perkaliai	Slope aspects S, inclination 30°, illumination 100 %, pasture, haying	*Pulsatillo-Phleetum phleoides*	*T. pulegioides* subsp. *silvestris*
12	Šiauliai reg., Pakapė forestry	Drained peatland, relief undulated, illumination 80 %	*Molinietum caeruleae*	*T. pulegioides* subsp. *pulegioides*
13	Šiauliai, Salduvė park	Sandgravel-pit, slope aspects E, inclination 45°, illumination 100 %	Unformed and antropogenised	*T. pulegioides* subsp. *silvestris*