1	2	3	4	5	6	7	8
o46	Deleni	83	2463	oo	oo	oo	
o47	Corbu	82	2584	oo	oo	oo	
o48	Hagota	82	2574	oo	oo	oo	
o49	Ocna Sibiu	83	3533	oo	oo	oo	
o5o	s	s	3534	oo	oo	oo	
o51	Săsăuşi	83	3632	oo	oo	oo	

Preevaluation codes:

CV = convarietas: A1 . convar.minor; A2 - convar.minor-equina; A3 - convar.equina; A4 - convar.equina-major; A5 - convar.major.

CL = testa colour: B1 - white, hell; B2 - yellow, light grey; B3 - brown, redish; B4 - violet; B5 -dark, blackish.

FO = seed form: C1 - sphaericus: C2 - sphaericus-ellipticus; C3 - ellipticus; C4 - ellipticus-compressus; C5 - compressus.

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NOTULAE BOTANICAE HORTI AGROBOTANICI, 1987, XVII

KARYOLOGICAL NOTES I.

CHROMOSOME NUMBERS OF Trifolium SPECIES FROM ROMANIA

N.L. TAYLOR

Abstract

TAYLOR N.L.,1986, Chromosome numbers of Trifolium species from Romania. Not. bot. hort. agrobot., Cluj., XVII,39-45. Trifolium accessions belonging to 13 clover species have been collected during a joint germplasm collecting mission organized in cooperation between USDA (USA) and ASAS (RSR) and samples were analysed for chromosome numbers. Eleven populations were 2n=14 diploid (T. arvense L., T. campestre L., T. pratense L.), eighteen populations were 2n=16 diploid (T. alpestre L., T. echinatum M.B., T. hybridum L. T.fragiferum L., T. montanum L., T. ochroleucon Huds., T. repens L.), three populations were 2n=4x=32 tetraploid (T. dubium Sibth., T. repens L.) and five were perhaps aneuploids on hexaploid, octoploid (T. medium L.) or higher ploidy levels (T. pannonicum Jacq.) Satellites were clearly identified in T. arvense, T. hybridum, T. ochroleucon and T. pratense accessions.

Key words: chromosme number, Trifolium, Romania

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Romania is situated on the Northern border of the Mediterranean center of diversity of the true clovers, where the most diversity in chromosome numbers and forms were found. This fact argues for the validity of hypothesis that the Mediterranean area is the center

of origin of the true clovers (ZEVEN et al. 1975, TAYLOR et al. 1980) and not western North America (ZOHARY 1972 ap. TAYLOR l.c.).

The genus Trifolium - rather dificult for karyological analysis - is not sufficiently known in respect of chromosome number and morphology, especially in consideration of the economical importance of the species concerned; 187 species have reported chromosome numbers from the total of about 250 (CLEVELAND in TAYLOR Ed., 1985).

There are few chromosome counts regarding the spontaneous Trifolium populations from Romania (TARNAVSCHI 1947, NIELSEN 1975); reports reproduce mostly the numbers established outside the area (TARNAVSCHI l.c., RESMERIȚA et al. 1975). Karyological research was concentrated in Romania on cultivated red clover, which is still differentiated microevolutionary - and taxonomically - from spontaneous populations (PUIA et al., 1980), in order to breed new tetrapoid cultivars (PAMFIL et al. 1980). Such new cultivars, as for example cv. "Napoca Tetra" may form in the future a source of disturbance for further red clover chromosome counts.

Material and Method

During a joint collection trip organized in 1984 in cooperation between USDA (USA) and ASAS (RSR) for forage legumes germplasm, true clovers(Trifolium spp.) were also collected and examined in order to establish the actual ploidy level of the studied populations.

42 clover accessions were collected. The accesions from this sample belong to 13 different species. This represents about one third of the species number reported from Romania (41 species and 5 hybrids, NYARADY 1957, RESMERIȚA et al. 1975).

After passing through quarantine, Trifolium seeds were mailed to the University of Kentucky for threshing and chromosome number determinations. Seeds were germinated and root-tips were collected and counted by the method of Anderson, et al. (1972). Seeds were harvested from mature plants and herbarium specimens were mounted for deposition in the Trifolium herbarium of the University of Kentucky. Plant introduction numbers were assigned by Dr. G.A. White, Plant Introduction Service (Table 1).

Table 1.

Chromosome numbers of Trifolium species from Romania as compared with earlier reports from the region and chromosome numbers reported from other parts of the world

Nr.	TRIFOLIUM	Acc. nr.	PI Nr.	Locality	Chromosome numbers 1	2	3	4
1.	- alpestre	T- 7	494 710	Rîşnov	16	16(2)	16	16
		T-18	494 711	Suceava	16			
		T-34	494 712	Craiova	16			
2.	- arvense	T-40	494 715 a	Domneşti	14			
		T-31	494 715	Craiova	14/2s	14	14	14,16
		T-33	494 714	Craiova				
3.	- campestre	T-14	494 716	Bistriţa	14	14(2)	14	14
		T-22	494 717	Suceava	14			
4.	- dubium	T-10	494 718	Predeal	32	14,16	28,32	16(2)
		T-17	494 719	Suceava	32			28(2)
								32
5.	- echinatum	T-41	494 720	Constanţa	16	-	-	16
6.	- fragiferum	T-24	494 722	Cluj-Napoca	16	16	16	16(2)
		T-1	494 721	Cîmpina	16			
7.	- hybridum	T- 9	494 732	Predeal	16	16(5)	16	16(2)
		T-21	494 724	Suceava	16			
		T-23	494 725	Cluj-Napoca	16			
8.	- medium	T-30	494 726	Suceava	62			
		T-26	494 726a	Macău Cluj	48		78-84	40,42
		T-29	494 728	Păget(Cluj-M.)	62		48(5),49(2),63(2	
							64,65,68,70,72,	
							80(5)126	
9.	- montanum	T-38	494 732	Huşăieşti	16			
		T-19	494 729	Suceava	16			
		T-27	494 730	Macău(Cluj)	16	-	-	16,32
		T-30	494 731	Păget(Cluj)	16			
10.	- ochroleucon	T-16	494 733	Suceava	16	16	16	16
		T-28	494 734	Macău(Cluj)	16/2s			
		T-37	494 743	Piteşti	16/2s			
11.	- pannonicum	T-15	494 735	Suceava	125	48-49	96	48,49,
		T-42	494 736	Bucureşti	125	65-90	130	60,65,126
							160	128,130,
								160
12.	- pratense	T- 5	494 709	Rîşnov	14	14(7)	14	14
		T- 6	494 737	Rîşnov	14			
		T-12	494 738	Predeal	14			
		T-13	494 739	Sf.Gheorghe	14/2s			
		T-25	494 740	Macău(Cluj)	14			
		T-32	494 741	Craiova	14/2s			
		T-36	494 742		14			
					14			
13.	- repens	T- 2	494 744	Bugteni	32			
		T- 3	494 745	Rîşnov	32	32(7)	32	32(2)
		T- 4	494 746	Rîşnov				
		T-39	494 749	Domneşti	32			

Note for Table 1.

a. 1. TAYLOR 1986
2. TARNAVSCHI 1947
3. RESMERIȚA et al. 1975
4. CLEVELAND in TAYLOR 1985

b. s = satellites indicate counts on material of known origin (Romania), numbers in brackets indicate the frequency of reports regarding a given chromosome number in the source cited.

Results and Discussions

Results of the examinations, as compared with earlier reports published from Romania, and other parts of the world (TARNAVSCHI l.c. RESMERITA et al. l.c., CLEVELAND l.c.) are presented in table 1.

In general, chromosome numbers agreed with published numbers thus verifying the identity of species. Only two species were wrongly identified (Table 1), which probably was the result of a mistake in labeling since these species are considerably different in morphology and not easily confused. One interesting collection was a low growing non-hairy form or variety of T. arvense (T40) classified gracile by Dr. George Turcu of Romania. The other collection of T. arvense (T-31) was strongly pubescent and both collections had 14 somatic chromosomes. The higest chromosome numbres found were those for T. pannonicum (125). Published counts range from 48 to 180 (Cleveland, 1985). The closest euploid number is 128, or 16 ploid of the base number 8. One collection of T. medium contained 48, and two others, 62 chromosomes. Cells with the many chromosomes are extremely difficult to count and it is possible that the 62-chromosome counts were actually 64 which would be the euploid number (8X). This is in agreement with the published numbers. T. medium (T-26) has been identified as T. sarosiense which is considered to be a subspecies of T. medium. It is reproductiyely isolated from T. medium, however, and crosses with the higher numbered T. medium are made with difficulty. Further investigations are necessary to determine the exact identity of this collection.

Three of the examined diploid species (T. arvense L., T. campestre L., and T. pratense L. ssp. pratense) have the basic number x=7, considered to be ancestral in the genus (GOLDBLATT 1981); six species (T. alpestre L., T. echinatum M.B., T. hybridum L., T. fragiferum L., T. montanum L., T. ochroleucon Huds. and one population of T. repens L. ssp. sylvestris) were on the diploid level of the secondary basic number 2n=2x=16. T. dubium Sibth. and two populations of T. repens were tetraploids: 2n=4x=32. Two of the examined species (T. medium L. and T. pannonicum Jacq.) - considered poliploids of more recent origin - were perhaps aneuploids of the hexaploid and octoploid (T. medium) respectively on higher ploidy level (T. pannonicum). One of them - T. pannonicum - is a vigurous long lived perennial (10-20 years or more), a subendemic species promising for biomass (especially as forgae for the wild), as well

as an ornamental plant in regions with more than 600 mm yearly rainfall (SZABÓ, 1986).

As compared with the percental values found for diploids in the whole Mediterranean region (84 % according to TAYLOR, Ed. 1985), in our - relatively small sample the percentage of diploids was lower (about 70 %), which may be in accordance with the general tendency toward polyploidisation and increased perennity found in northern and mountain areas, as compared with much higher frequency of diploid annuals in the Mediterranean lowlands (TAYLOR et al.1979).

It is perhaps worth to note, that both high-level polyploids (T. medium, T. pannonicum) have their origin in the Charpatian Basin. These are represented in our samples perhaps as aneuploids in octoploid, decaploid and higher levels. These polyploids "represent an incompletely assessed group in respect to ranges, sizes of populations and economic utillity. It is hoped that more work will be done with them" (CLEVELAND l.c.).

R e z u m a t

NOTE CARIOLOGICE I.

TAYLOR N.L., 1986 , Numere de cromosomi la specii de Trifolium din Romania Not. bot. hort. agrobot., Cluj., XVII,39-45. In engleză. Au fost examinate 42 de accesii i aparţinătoare la 13 specii de Trifolium. Probele au fost colectate în cursul unei expediţii comune de colectare de germoplasmă, organizată în colaborare între USDA (USA) şi ASAS (RSR). S-au identificat 11 populaţii diploide la 2n=2x=14 (T. arvense L., T. campestre L., T. pratense L. ssp. pratense), optsprezece populaţii diploide la 2n=2x=16 (T. alpestre L., T. echinatum M.B., T. hybridum L., T. fragiferum L., T. montanum L., T. ochroleucon Huds. şi T. repens L. ssp. sylvestris ?).Cinci populaţii au fost tetraploide la 2n=4x=32 (T. dubium Sibth. şi T. repens L.) şi cinci, fiind probabil poliploizi aneuploizi, sînt la nivel octoploid (T.medium L.), sau peste (T. pannonicum Jacq.). Au fost identificaţi chromosomi cu sateliţi la populaţiile de T. arvense, T.hybridum, T. ochroleucon şi T. pratense.

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