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INSTITUTUM AGROBOTANICUM "DR. PETRU GROZA" CLUJ-NAPOCA (ROMANIA)
NOTULAE BOTANICAE HORTI AGROBOTANICI, 1984, XIV

COMPARISON OF CZECHOSLOVAK AND ROMANIAN VARIETIES OF RED CLOVER (TRIPOLIUM PRATENSE L.)

V. VACEK, J. SMRZ

Abstract:

VACEK V., SMRZ J., 1984, Comparison of Czechoslovak and Romanian varieties of Red Clover (Trifolium pratense L.) Not. bot. hort. agrobot., Cluj, XIV. 17-24

Twenty-eight varieties of red clover (Trifolium pratense L.)- among them three Romanian varieties - were tested under different conditions at three stations of the Research and Breeding Institute for Fodder Plants (1980-1982). Results of the first harvest year (1981) , Czechoslovak varieties and new breedings were compared with Romanian varieties: in total yields of green fodder from three stations the variety Napoca Tetra was best. The variety was characterized by large leaf area, typical for Romanian. diploid varieties as well. From the viewpoints of quality, crude protein and fibre content the Romanian varieties were among the best. Rate of infection by viruses was the lowest in the tetraploid varieties (among them in Napoca Tetra); the diploid varieties suffered from virus diseases to a greater extent.

Key words: Trifolium pratense, variety trial, Czechoslovakia, Romania.

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Systematic and permanent study of foreign varieties of this research project was carried out at Troubsko-based Research and Breeding Institute for Fodder Plants. Two hundred and six varieties of red clover (Trifolium pratense L.) have been evaluated since 1961. The aim of the studies was to compare contemporary Czechoslovak traits and find

new material for breeding purposes. Evaluation criteria have been determined by long-term breeding plants of the Czech Ministry of Agriculture and by ideotypes drafted up to the year 2000. From the methodological viewpoint these studies have been carried out according to Classifiers for variety descriptions compiled in cooperation with CMEA member countries.

Twenty-eight varieties in three stations of the Research and Breeding Institute for Fodder Plants have been tested during the trial stage 198o (the sowing year) - 1982; three cultivars were of Romanian origin. As these results showed satisfactory characteristics of the Romanian varieties, more details will be introduced.

Materials and methods

Trials with varieties of red clover were conducted at three stations of the Research and Breeding Institute for Fodder Plants: At Troubsko-based Institute, where the plots belonged to sugar-beet growing region, wheat subregion, at the altitude of 280 m s.m., the trial took place in degraded chernozem. Long term annual average temperature was 8,4°C, total precipitation was 547 mm, 344 mm during vegetation period. In the trial year 1981 the average annual temperature was 8,4°C, total precipitation 597 mm, 335 mm during vegetation period.

Slavice-based breeding station is situated in potato-growing region, wheat subregion, at the altitude of 49o m on sandy-loam soil. Long-term annual average temperature was 6,4°C, precipitation 545,7 mm - during vegetation period 351 mm. In the year 1981 average temperature was 6,3°C, total precipitation 538 mm, in the course of vegetation period 332 mm.

The Breeding Station at Domoradice is located in sugar-beet growing region, wheat subregion; the trial was conducted at 38o m altitude on sandy-loam plot. Long-term average temperature was 8,4°C, total precipitation 746 mm, during vegetation period 458 mm. In 1981 the average annual temperature was 8,o°C, total precipitation 857 mm, 484 mm in the course of vegetation period.

Each variety was sown on a 5 m^2 experimental plot, three replications were used for observation of fodder yields, three for seed. Seeding of six million germinative grains per 1 ha, seeding without companion crop, width of rows 2o cm. Once-over harvest, 1st cut at the onset of blooming of standard variety (diploid Start, tetraploid Kvarta); two (exceptionally three) cuts per year. Apart from fodder

yields a number of morphological traits were evaluated as factors of yields formation or quality. Chemical analyses were assessed on samples, which were gradually taken away in accordance with the phenophase of varieties.

Intensity of occurence of plants with virus mosaic was determined according to scale 1 - 5, for serologic identification antiserum for BYMV (bean yellow mosaic virus), RCVMV (red clover vein mosaic virus), AMV (alfalfa mosaic virus) and PTNV (pea top necrosis virus) were used (SMRZ et al. 1977, MUSIL et al. 1977).

Results and discussion

Ten varieties were enlisted in the Czechoslovak List of Varieties in 1982; four of them were tetraploid and six diploid varieties; one was one-cut. Tetraploid cultivar Kvarta and diploid cultivar Start had dominant position from the viewpoint of biomass formation. Czechoslovak plant breeders have been intensively working on new breedings, the biological and economic characteristics of which are determined by long-term plans and prognoses with concrete demands (COLLECTIVE, 1979), apart from basic targets i.e. the increase of dry-matter yield, crude protein and increase and stabilizing seed yields, there existe a series of specific demands like yield adjustment, higher ecological plasticity in relation to climatic conditions, developmental differentiation (later and earlier types), types for seeding without companion crop, synchronization of blooming and, last but not least, higher resistance to powder mildew, fusaria, canker, nematode and viroses.

The collection of foreign varieties has been playing an important role in implementing above-mentioned widespread range of tasks. Since the release of effective varieties Start (in 1973) and Kvarta (in 1974), 63 varieties (11 of them tetraploid) were tested in three-year periods (sowing year and two harvest years) in years 1973-75, 38 varieties (14 of them tetraploid) in years 1977-78 and 28 varieties (1o of them tetraploid) in years 198o-82. The trials in years 1973-78 showed that the Chechoslovak varieties as local adapted materials were marked by high efficiency and only few foreign varieties were statistically significantly better (e.g. KUHN and MARINO). The ways of increasing yield stability, quality and health condition can be found in utilizing further complexes of traits and characteristics as for example early maturing in varieties from France and Switzerland, regrowth dynamics in varieties Tamara, Jubilatka, Tápiói, Granta; persistance

in cultivars Sally, Astra, and in Swedish varieties etc. (VACEK and TOMASOVICOVÁ, 1978/79; TOMASOVICOVÁ and VACEK, 1981).

Table 1.

Green-matter yield in 1981 (1st harvest year) $t.ha^{-1}$

Variety	Troubsko	Slavice	Domoradice	Average	%	Order
Kvarta	92,34	66,6o	66,97	75,3o	1o7,28	2
DO-DT-1	91,26	81,34	65,43	73,34	1o4,49	3
Napoca Tetra	88,o6	79,27	72,oo	79,78	113,66	1
Start	9o,87	66,87	52,94	7o,19	1oo,oo	5
CH-1	95,33	74,o7	46,86	72,o9	1o2,71	4
SE-3	85,53	65,13	49,66	66,77	95,13	6
Select-1	93,53	58,2o	36,4o	62,71	89,34	7
Transilvania	77,2o	62,8o	38,8o	59,6o	84,91	8

Table 2.

Dry-matter yield in 1981 (1st harvest year) $t.ha^{-1}$

Variety	Troubsko	Slavice	Domoradice	Average	%	Order
Kvarta	13,o8	14,88	11,o6	13,o1	92,o7	6
DO-DT-1	12,42	18,15	1o,97	13,85	98,o2	2
Napoca Tetra	12,55	17,17	11,8o	13,84	97,95	3
Start	15,5o	16,39	1o,49	14,13	1oo,oo	1
CH-1	15,o9	17,23	8,41	13,58	96,11	5
SE-3	14,89	16,55	9,64	13,69	96,89	4
Select-1	16,oo	14,47	7,21	12,56	88,89	7
Transilvania	12,62	16,33	7,51	12,15	85,99	8

The last trial stage finished in 1982 brought new remarkable results: first of all in varieties from Romania unknown so far in Czechoslovakia. From the viewpoint of green-matter yields (Tab.1) the best is cv. Napoca Tetra exceeding the Czechoslovak cultivar Kvarta in a complex of cuts in 1st year on three sites by 6,37 %. Materials marked DO-DT 1, CH-1 and SE 3 represent new Czechoslovak breedings (not registered yet). Higher yields at Troubsko can be explained by three cuts while there were only two cuts at other stations. There was less precipitation during vegetation period at Troubsko in comparison with long-term average; therefore varieties reacted in a different way: in cv. Select 1 the yield was 5o,73 t . ha^{-1} in 1st cut; 29,87 t in 2nd cut and 12,93 t in 3rd cut, while e.g. in cv. Kvarta this ration was 6o,6o : 21,47 : 1o,27 t. Resistance to drought in cv. Select 1 was already emphasized by SAVATTI and GOIA (1971). While tetraploid Kvarta was marked by lower dry matter content, cv. Napoca Tetra and DO_DT 1 surprised by high degree of efficiency in dry matter (Tab.2) in comparison with the variety Start. VARGA (1978) indicated that cv. Napoca Tetra gave up to 20 $t.ha^{-1}$ dry matter in favourable conditions even on non-irrigated plots.

Table 3.

Leaf area (cm^2) of one stem in 1st cut of 1st harvest year

Variety	Troubsko	Slavice	Domoradice	Average	%	Order
Kvarta	132,9	1o4,5	121,6	119,67	169,58	2
DO-DT-1	96,5	112,1	131,1	113,23	16o,45	3
Napoca Tetra	121,2	94,1	157,7	124,33	176,18	1
Start	82,5	55,5	73,7	7o,57	1oo,oo	8
CH-1	92,6	57,7	73,9	74,73	1o5,89	7
SE-3	82,5	65,6	78,4	75,5o	1o6,99	6
Select-1	1o2,7	75,9	72,1	83,57	118,42	5
Transilvania	11o,4	91,3	77,9	93,2o	132,o7	4

Cv. Napoca Tetra was characterized by robust leaf and a large total assimilation leaf area from one stem as shown in Tab.3. Diploid cultivars Transilvania and Select 1 were significant by large leaf share. The content of crude protein is shown in Tab.4. (with Romanian varieties ranked among the best) and in Tab.5 where on the contrary fibre content was the lowest in Romanian varieties. High content of crude

protein in cv. Napoca Tetra was confirmed in the investigation of eleven varieties by SAVATTI et al. (1978).

Table 4.

Crude protein content (of loo% dry matter) in 1st cut of 1st harvest year

Variety	Troubsko	Slavice	Domoradice	Average	%	Order
Kvarta	17,77	16,54	16,24	16,85	115,78	4
DO-DT-1	18,93	15,57	16,9o	17,13	1o8,49	2
Napoca Tetra	18,77	17,o8	17,92	17,92	113,49	1
Start	17,58	15,27	14,53	15,79	loo,oo	7
CH-1	17,72	15,3o	15,47	16,16	1o2,34	6
SE-3	17,48	14,81	14,75	15,68	99,3o	8
Select-1	18,62	15,o1	17,41	17,o1	1o7,73	3
Transilvania	18,33	15,66	16,o5	16,68	1o5,64	5

Table 5.

Fibre content (of loo % dry matter) in 1st cut of 1st harvest year

Variety	Troubsko	Slavice	Domoradice	Average	%	Order
Kvarta	24,66	28,4o	26,95	26,67	loo,38	7
DO-DT-1	22,91	27,38	26,41	25,57	96,24	1
Napoca Tetra	24,1o	27,79	24,85	25,58	96,27	2
Start	25,53	28,37	25,82	26,57	loo,oo	6
CH-1	25,95	28,83	27,49	27,42	1o3,2o	8
SE-3	24,o8	26,14	28,16	26,13	98,34	4
Select-1	25,56	28,92	24,o1	26,16	98,46	5
Transilvania	25,95	28,84	23,48	26,o9	98,19	3

The occurence of mosaic plants was low in the first harvest year. Therefore detailed evaluation was carried out in the following year only when there was remarkable differentiation as to the intensity of diseases. Rate of infection was the lowest in all three tetraploid varieties, differences were even greater in diploid varieties. Four kinds of viruses were isolated by means of a biological test from ten sampled virus plants in each sort. The most frequent in all varieties has been the

yellow mosaic virus (BYMV), which was either found in plants under investigation alone or in mixture with alfalfa mosaic virus (AMV) or pea-top necrosis virus (PTNV) and red clover vein mosaic virus (RCVMV). Tab.6 shows that the varieties were infested by 3 or 4 viruses (SMRZ et al. 1983). On the collection under investigation the healthiest was cv. Napoca Tetra, which according to CEAPOIU (1976) was characterized of medium-size resistance to mildew (Erysiphe polygoni DC.) and clover leaf spot (Pseudopeziza trifolii (Biv.-Bern.) Fuck.).

Table 6.

Variety	Rate of infection	BYMV	AMV	PTNV	RCVMV
Kvarta	1,o	1o	4	3	-
DO-DT-1	1,o	1o	2	2	1
Napoca Tetra	1,o	1o	2	1	-
Start	1,2	9	3	4	-
CH-1	1,8	9	4	3	-
SE-3	1,3	1o	5	3	3
Select-1	1,5	1o	2	4	4
Transilvania	2,3	1o	2	2	4

Finally, there can be stated that detailed study of foreign varieties of red clover and other crops will give us a clearer picture of the worldwide structure of the crop, contemporary level of breeding both in this country and abroad and will enable us to choose suitable provenances for the breeding programme as shown here on the results with Romanian varieties. The researoh is still going on.

Rezumat

VACEK V., SMRZ J., 1984, Evaluarea comparativă a unor soiuri cehoslovace şi româneşti de trifoi roşu (Trifolium pratense L.) (în engleză). Not. bot. hort. agrobot., Cluj, XIV. 17-24

Trei soiuri româneşti de trifoi roşu (Trifolium pratense L.) au fost încercate comparativ cu alte 28 de soiuri de trifoi roşu, în trei staţiuni diferite din Republica Socialistă Cehoslovacă între anii 198o-1983. In această lucrare sînt prezentate unele rezultate din primul an de exploatare. Napoca Tetra a dat recolta cea mai ridicată de masă verde în toate cele trei staţiuni. Acest soi este carac-

terizat printr-o suprafaţă foliară foarte mare, tipică dealtfel pentru soiurile româneşti. Din punct de vedere al calităţii (proteină crudă, conţinutul în fibre), soiurile româneşti s-au situat printre cele mai bune. Infecţia virotică a fost mai scăzută la soiurile tetraploide în general, soiurile diploide fiind mai puţin rezistente.

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INSTITUTUM AGROBOTANICUM "DR. PETRU GROZA" CLUJ-NAPOCA (ROMANIA)
NOTULAE BOTANICAE HORTI AGROBOTANICI, 1984, XIV

ETUDES CONCERNANT LA DEVELOPPEMENT PHENOLOGIQUE DE L'ESPECE COLCHICUM AUTUMNALE L.

L. MUNTEAN, Al. SALONTAI, C. BOTEZ
S. CERNEA, V. CÂREAN

Abstract:

MUNTEAN L., SALONTAI Al., BOTEZ C., CERNEA S., CAREAN V., 1984, Etudes concernant la developpement phenologique de l'espece Colchicum autumnale L. (Research regarding the phenological development of Colchicum autumnale L.), Not. bot. hort. agrobot., Cluj, XIV, 25-32 Colchicum autumnale grown from formed, in the first five year of life, only vegetative organs. In the 4th year in the soil new bulbotuber was formed with a new protuberance and above the ground the first leaf pair appeared (the was single leafed in the first three years). In the 5th year the protuberance and the leaf pair was much more developed and in September-November the growth of a vegetative bud started from the bulbotubers but no flowers appeared.

Key words: Colchicum autumnale, development, phenology.

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Dans différents ouvrages on présente la morphologie et la biologie de Colchicum autumnale L. développé de bulbotubers (1,2,3,7). A la suite des recherches effectuées à Cluj-Napoca on a présenté antérieurement les éléments principaux de la croissance et du développement de cette espèce issu de graines de la première (4), la deuxième (5) et la troisième (6) année de végétation.

Il est à mentionner que la Colchique d'automne semé sous une plante protectrice (Lolium perenne) a poussée après une année. De la graine il en resort, à la germination, un axe court mésocotyle d'où vont prendre naissance, dans la première année, les organes souterrains (l'hippocotyle, le bulbotuber petit et la racine) et à la surface du sol,