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N. H. CHAMBERLAIN

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EDITOR'S NOTE

I would like to express sincere thanks to Professor G.E. Russell, who retired as editor of the Cereal Rusts Bulletin, on behalf of all contributors to and recipients of the Bulletin. He was faced with a shortage of contributions during the time that he was editor but nevertheless successfully succeeded in producing two issues of the Bulletin each year.

The production of Volume 10, Part 1 has again been delayed due to shortage of contributions. For the Bulletin to succeed and be produced twice a year, a regular supply of papers is required. Papers can be on any subject concerned with cereal rusts, such as techniques, pathogen virulence surveys, breeding for resistance, genetics of resistance, sources of resistance, control, or any other topic which may be of interest to cereal rust workers.

I hope I can receive a regular supply of contributions to enable th Bulletin to be produced promptly twice each year. Contributions should be sent to me at the address below:

Dr. N.H. Chamberlain,
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S U B S C R I P T I O N S

The Bulletin is published twice a year and is sent directly to subscribers on payment of an annual subscription. Alternatively, orders can be placed through booksellers at an extra cost. Enquiries regarding subscriptions and orders should be sent to Dr. J.E. Parlevliet, Treasurer, European and Mediterranean Cereal Rusts, Foundation Institute of Plant Breeding, 166 Lawickse Allee, Wageningen, The Netherlands.

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RESISTANCE TO LEAF RUST OF BARLEY IN SOUTHERN TEXAS

BY

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SUMMARY

Leaf rust of barley in southern Texas has not accumulated a large number of virulence genes. Resistance sources to the pathogen from this area are numerous and could be easily identified.

Leaf rust (*Puccinia hordei* Otth.) of barley (*Hordeum vulgare* L.) represents a serious threat to barley production in southern Texas. The production of barley is limited each year by severe outbreaks of leaf rust. Resistant varieties have not yet been developed for this particular region. However breeding programmes to incorporate leaf rust resistance of barley are currently underway. This paper describes the evaluation of possible resistance sources for southern Texas.

MATERIALS AND METHODS

In connection with a USAID-project (Agency for International Development for Improving Disease Resistance in Barley) a number of barley cultivars/lines with resistance to several isolates of *P. hordei* from the Mediterranean area were identified earlier (Sharp and Reinhold 1982). A field nursery including these resistance sources as well as the international differential cultivars and the susceptible check Moore C.I. 7251 was grown near San Antonio, TX. during the Winter/Spring 1981. Due to the late development of an epidemic only one field assessment was accomplished at heading time. The infection type and the disease severity were recorded.

RESULTS AND DISCUSSION

Twenty five out of seventy two entries were completely resistant to *P. hordei* under field conditions in San Antonio, TX.(Table 1). Nine cultivars/lines exhibited a low infection type in combination with low severity and were rated moderately resistant. Some of the resistance sources identified carry known *Pa*-genes. A number, however, appear to be previously undescribed (eg. San Carlos, Amber). A third group of plants expressed a high infection type concomitant with a very low severity. These were considered slow rusting. Vada has been earlier reported to be partially resistant or slow rusting (Clifford 1970, 1972, Parlevliet 1975).

Resistance to *P. hordei* in barley occurs in diverse genetic backgrounds. Some material seemed to be well adapted to growing conditions in southern Texas and could readily be used in local breeding programmes.

Among the thirteen differential cultivars (Clifford 1974, 1977, Tan 1977a, 1977b) only four were susceptible to P. hordei in southern Texas (Table 2). In this area the pathogen apparently has not accumulated a large number of virulence genes. This is in line with Van der Plank's (1968) thesis of stabilizing selection in favour of races of the pathogen with no unnecessary virulence genes. North American barley cultivars generally lack resistance to P. hordei thus no selection pressure for higher virulence has been placed on the pathogen. However race surveys conducted for other regions (Clifford 1974, Reinhold and Sharp 1982) indicated the common occurrence of widely virulent races of P. hordei.

Our results also show that the Pa_2 gene or its complex needs further clarification. This aspect has earlier been noted by Tan (1977).

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Table 1. Resistance sources to *Puccinia hordei* in barley

Highly Resistant		Moderately Resistant	Slow Rusters
Variety	Variety	Variety	Variety
Aim (Pa_3)	Gordon CI 2674	Batna CI 3391 (Pa_2+)	Vada CI 11806
Bolivia CI 1257 (Pa_2+Pa_6)	Heil's Hanna CI 682	Brevia PI 399487	Menelik CI 5862
Cebada Capa CI 6193 (Pa_7)	Giza 117/Baktim/(Icarda Cross) Giza 118/FAO 86	Juliaca CI 1114	Menuet
Estate CI 3410 (Pa_3)	Giza 119/ (Icarda Cross) Tanekasse 105	Ariana Ci 2524 (Pa_2+)	Herta CI 8097
Forrajerra Klein/Rika CI 11801 (Pa_7)	Ford 1203 (Ford Collection)	Magnif 102 CI 13806 (Pa_5)	
La Estanzuella (Pa_7)	CCIM-13 (Cymmit Line)	3309-Attiki/XV 12240-OSK	
Quinn CI 1024 (Pa_2+Pa_5)	Hybernum Hor 728 CI 11577	CI 13575	
San Carlos CI 11533	Praecox mass sel. 8CI 4974		
Amber	Hor 2596 CI 1243	CI 7890	
Magnum	CI 4976		
Athenais	CI 8612		
Chile Brewing CI 657			

Table II - Reaction of differential varieties to *Puccinia hordei* in Southern Texas.

Variety		Pa-gene(s)	Reaction Type
Sudan	CI 6489	$(\underline{Pa})^{1}$	S
Peruvian	CI 935	$(\underline{Pa}_2)^{2}$	I
Batna	CI 3391	$(\underline{Pa}_2+)^{1}$	I
Reka I	CI 5051	$(\underline{Pa}_2+)^{1}$	S
Ricardo	CI 6306	$(\underline{Pa}_2+)^{1}$	I
Quinn	CI 1024	$(\underline{Pa}_2+\underline{Pa}_5)^{1}$	R
Magnif	CI 13806	$(\underline{Pa}_5)^{3}$	I
Bolivia	CI 1257	$(\underline{Pa}_2+\underline{Pa}_6)^{1}$	R
Estate	CI 3410	$(\underline{Pa}_3)^{1}$	R
Gold	CI 1145	$(\underline{Pa}_4)^{1}$	S
Cebada Capa	CI 6193	$(\underline{Pa}_7)^{4}$	R
Egypt	CI 6481	$(\underline{Pa}_8)^{5}$	S
Hor 2596	CI 1243	$(\underline{Pa}_9)^{6}$	R

1. Roane and Starling (1967)
2. Clifford (1974)
3. Antonelli et al. (1967)
4. Nover and Lehmann (1974)
5. Tan (1977a)
6. Tan (1977b)

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MONITORING A NEW VIRULENCE OF RACE 24 OF STEM RUST OF WHEAT IN INDIA DURING 1981

BY

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Many new biotypes of wheat stem rust (Puccinia graminis var. tritici Pers, Erikss and Henn) have been detected during last 15 years (Bahadur et. al.1981, Sharma et. al., 1975, 1979 and Sinha et. al. 1976, 1978). While studying the pathogen variability a new biotype of race 24 was identified during 1981. It has identical reactions on the standard differentials (Stakman et. al., 1962) to those of race 24, but in addition produces susceptible reactions on the supplementary differentials - Charter, Yalta and E. 535 and therefore, has been designated as 24A. Also race 24A is differentiated from race 24 on the isogenic lines Sr 11 and 22 (Table 1). During winter in December, at a temperature range of 6-22°C, both race 24 and the new biotype 24A produce susceptible reactions on Khapli and partly confirms the observations of Mehta (1940).

Table 1 - Reactions on supplementary differentials and other Sr lines.

Supplementary differentials and Sr. lines	Virulences 24	24A
Charter	O;	4
Yalta	O;	4
E 535	O;	4
Sr 11	O;	4
Sr 22	O;-1	4

Race 24 is virulent Sr 1, Sr 6, Sr 7, Sr 8, Sr 9a, Sr 9b, Sr 10, Sr 13, Sr 14, Sr 15, Sr 17, Sr 19-20 (present in one line), Sr 21 and Sr 23 and avirulent on Sr 11, Sr 16, Sr 22, Sr 24, Sr 25, Sr 26, Sr 27, Sr 28, Sr 30 and Sr Tt-2; while 24A in addition is virulent on Sr 11 and Sr 22 and avirulent on Sr 16, Sr 24, Sr 25, Sr 26, Sr 27, Sr 28, Sr 30 and Sr Tt-2.

Race 24 first detected in 1933 (Mehta, 1940) appears to be a simple race having 2 factors for virulence, as per its reaction on the standard (Stakman et. al. 1962) and supplementary set of differentials that are effective against Indian races (Bahadur et. al. 1981). As a consequence of cultivation of dwarf wheats in India, this race was not traceable since 1973 till the arisal of a new biotype 24A during 1981 (Fig. 1). This new biotype has 5 factors for virulence, which shows that it is more complex race (Vanderplank 1963).

Since Barberris spp., the alterate host is non functional in India (Mehta, 1940), arisal of new races and biotypes is probably by mutation and parasexuality. Under such situations the number of standard races produced would be less while chances of variation within a race will be higher (Luig and Watson 1970). In India, between 1966-1980 four new biotypes, namely 11A, 40A, 40A-1 and 117A-1 have been reported which implies that every 3 years there is a chance for the appearance of a new biotype in Southern and Penninsular India (Bahadur et. al., 1981). Parallel evolution of a pathogen is dictated by the host resistance genes. The arisal of a race 24A is in conformity of the observations of Luig and Watson (1970), that under situations where Berberis spp has no role to play, biotypes are likely to appear.

The following wheat lines possess seedling resistance against race 24A namely, CPAN-1796, CPAN-1839, HB-208, HB-600, HD-85, HD-96, HD-2009, HD-2235, HD-2278, HI-732, HUW-107, HUW-108, HW-153, IWP-503, J-325, K-7835, Raj-1865, VL-421, VL-456, VL-464, WL-410 and WL-711.

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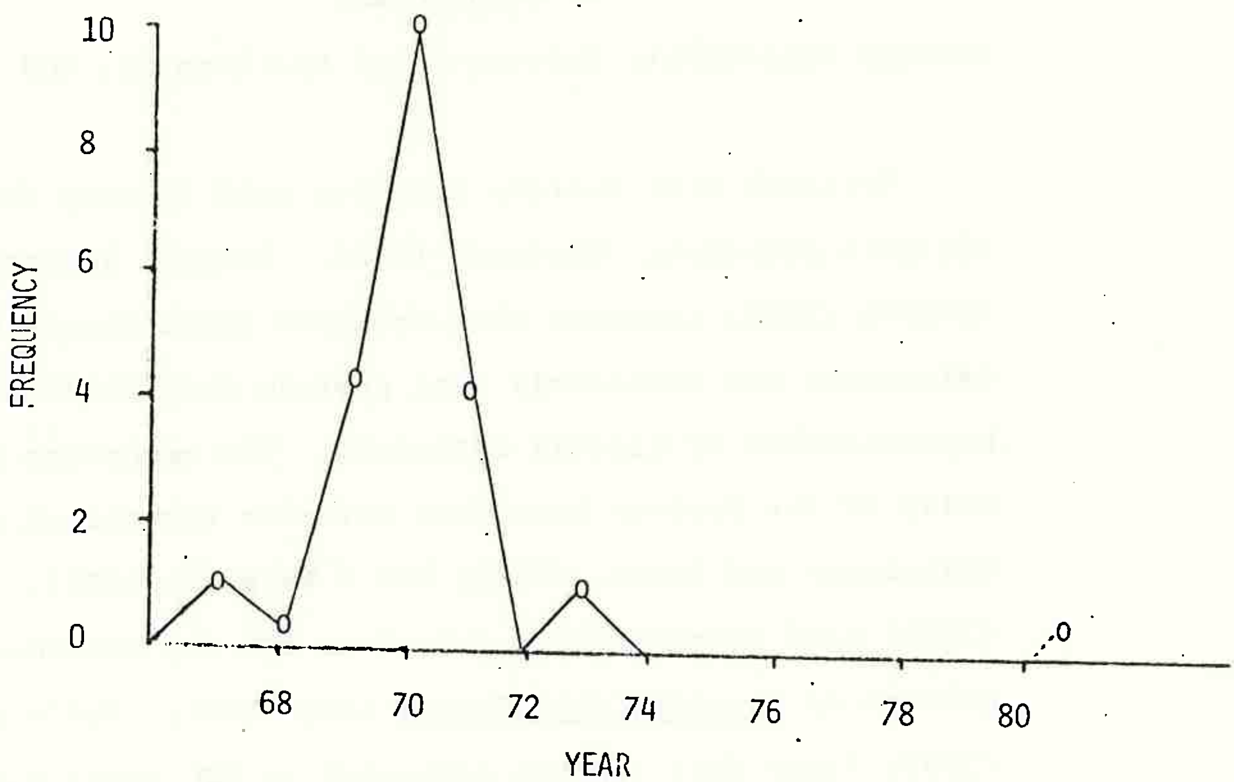

Fig. 1 The Percentage Frequence of Race 24 and 24A during last 15 years as shown. Symbols o——o and o---o stand for races 24 and 24A respectively.

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THE USES AND LIMITATIONS OF DETACHED LEAF CULTURE FOR THE ASSESSMENT OF REACTION TYPE IN YELLOW RUST OF BARLEY

BY

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Detached leaf culture has been used in many studies of obligate pathogens (Yarwood, 1946). Person, Samborski & Forsyth (1957) reported that detached wheat leaves could be maintained for relatively long periods when floated on benzimidazole or kinetin solutions. The mechanism lies in a delay of the protein breakdown normally associated with leaf senescence and decay, (Wang, Hao & Waygood, 1961). Doling (1964) used benzimidazole solutions for the detached leaf culture of *Puccinia striiformis* from wheat. Wolfe & Macer (1964) found that certain cultivars in the wheat differential set for *P. striiformis* gave variable results when tested in detached leaf culture. These were the cultivars giving variable results in whole seedling tests. During the course of work on *P. striiformis* on barley, to be described elsewhere, a reasonably reliable technique for testing the reactions of detached barley leaves to *P. striiformis* was evolved.

MATERIALS AND METHODS

The barley cultivars Astrix, Bigo, Sultan, Mazurka and Varunda, and isolates of four barley yellow rust races, namely B/23 of race 23, B/24, B/72/14 or race 24CP and B/72/32 of race 24VV were used. These were kindly supplied by N.I.A.B., Cambridge. Two parts of a 40ppm solution of benzimidazole (from Koch-Light Laboratories Ltd., England) and one part of 0.1% glucose in sterile distilled water were used for floating the detached, inoculated leaves.

The barley plants from which leaves were to be detached were grown in a glasshouse at 15-20°C in polythene-covered cages. The lengths of the expanding leaves were recorded daily until increase ceased: the leaf was then regarded as mature. Leaves 1-8 up the main shoot 1 day past maturity were used. In a preliminary experiment it was established that the basal part of a leaf is the physiologically best part for detached leaf culture. The leaves were detached from the plants prior to inoculation and were inoculated with fresh urediospores with a sterile paintbrush. The inoculated leaves were cut into 3.5 cm long segments and floated on the benzimidazole + glucose solution, in plastic 'repli' dishes (Sterilin Ltd., Middx.) modified by removing alternate partitions to accommodate 3.5 cm long leaf segments. The 'repli' dishes were incubated at 5°C for 48 h, and then transferred to a lighted incubator at 10°C or 15°C, with an 8 h daily dark period.

The reaction types were recorded on the 14th, 17th and 21st days after inoculation. Intact leaves on whole plants were also inoculated simultaneously and incubated in the glasshouse. The reaction types on intact plants were assessed for comparison with the corresponding segments in detached leaf culture.

RESULTS

The reaction types at 10°C did not differ much from those at 15°C, but the development of the reaction type was delayed by a few days and the segments kept healthy for longer (up to 4 w-eks). At 15°C the reaction types were recorded on the 17th day, and at 10°C on the 21st day after inoculation. The reaction types of the detached leaves of cultivars Bigo, Mazurka and Varunda were markedly different from those of the corresponding leaves on whole plants in the glasshouse, which were more resistant (Table 1.) For primary leaves the reaction type usually shifted from O or On on whole plants in the glasshouse to II-III on detached leaves. However, the reaction type of later formed leaves (leaf 4 - juvenile and leaves 5-8 - adjul) which were of type OO or I in the glasshouse rose only to I-II on detached leaves. Bigo is reported to be resistant to all races of P. striiformis so far described in Britain, except for the race known as 1,2,3,4,5; Mazurka and Varunda are differential cultivars for races 24 MV and 24 VV respectively (Priestley & Byford, 1975). The very resistant (type i, OO or O) reaction given by Astrix to race 23 in the glasshouse was, however, very stable, being maintained on detached leaves.

DISCUSSION

Almost all detached leaf culture workers have reported some results where the reactions differ from those on intact plants, and none of them are entirely satisfied that reactions on detached leaves always mirror accurately those on intact plants. The results reported here indicate that detached leaf culture can give an approximate indication of the reaction type on whole plants, but that it does not always give precisely the same reaction type. In particular, if the reaction type is intermediate on the whole plant, it can be anything from 0 to 4 in detached leaf culture. In the present experiments a type On reaction has never changes to a fully susceptible type III or IV. If information is required on the precise reaction of a plant, whole plants should be used for testing.

Experience with a limited number of races and cultivars indicates that the detached leaf technique is more reliable for mature leaves than seedling leaves where the reaction type often shifts from resistance to susceptibility (type II-III reaction).

The author wishes to thank Dr. J.G. Manners for reading the manuscript of the paper.

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Table 1 - Comparison of reaction types of barley races of <u>Puccinia striiformis</u> in detached leaf culture at 15°C and on whole plants in the glasshouse.

Cultivar	Race	Leaf 1		Mature Leaf (Leaf 8)	
		Detached Leaf	Whole Plant	Detached Leaf	Whole Plant
Astrix	23	i	OO	i	O
	24	III-II	III-IV	III	III
	24CP	III-IV	III-IV	III	III
	24VV	IV	III-IV	III-IV	III
Bigo	23	II-III	O	I-II	OO
	24	II-III	OO	II	O
	24CP	II-III	OO	I-II	OO
	24VV	II-III	O	I-II	OO
Mazurka	23	II-III	On-I	I	OO
	24	II-III	O-On	II	OO
	24CP	I-II	On-1	II	OO
	24VV	II-III	O-On	I-II	OO
Sultan	23	III-IV	III-IV	III	III
	24	III-IV	III	III	III
	24CP	III-IV	III	III-IV	III
	24VV	III-IV	III	III-IV	III
Varunda	23	I-II	On-1	I	OO
	24	II-III	On-1	I-II	OO
	24CP	I-II	On	I	OO
	24VV	II-III	II-III	I-II	II

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THE RUST SITUATION ON BARLEY AND WHEAT IN CYPRUS IN 1981

BY

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In 1981 the weather conditions were favourable for the development of cereal rust diseases. In wheat, traces of leaf rust and yellow rust were recorded on the durum wheat varieties Aronas, Mesaoria and Kyperounda. In fact, rust incidence on wheat was negligible during the last 10 years.

In barley, however, many foliar diseases especially leaf rust, powdery mildew, net blotch and scald were recorded. The Coefficient of Infection (CI) of leaf rust for the main commercially grown variety Athenais was 16 at Laxia, 22 at Dromolaxia and zero at the third location, Akhera. In general, rust incidence of barley varied significantly with location.

Rust data were recorded on the thousands of genotypes (segregating populations, introduction nurseries and yield trials). Selected resistant lines are used in the crossing programme. The recently released barley variety Kantara, which is expected to replace Athenais, was resistant to leaf rust, which an ACI over trials ranging from 0.4 to 3.6 at the various locations (Table I). This new variety was more resistant than most of the new lines tested in the advanced yield trials (35/1/C-35/1/E) or in the preliminary yield trials (35/1/A-35/1/B). Kantara, however, was more susceptible to stripe rust recorded at one location than Athenais and other promising varieties. Interestingly, none of the 300 varieties tested in yield trials outyielded significantly Kantara.

Yield losses from rust and other diseases were estimated in one trial conducted at Athalassa in which Athenais, Kantara, Mari-CM 67-CMB72-140-8Y-3Y-1B-1Y-OB and a mixture of 18 barley varieties susceptible to various diseases were treated with Bayleton. Athenais, which was susceptible to net blotch (not controlled by Bayleton), gave no response to chemical control. Kantara, susceptible to yellow rust, gave 38% higher grain yield in sprayed, disease-free, than in control plots. Mari-CM67 was attached by yellow rust and powdery mildew (both controlled by Bayleton) but yields were not higher compared with non-sprayed plots. It appears that this variety has tolerance of rust and mildew. The studies, on estimation of yield losses continue in 1982 at four locations.

Table 1 - Coefficient of infection (CI) for leaf rust on barley varieties at four locations in Cyprus in 1981.

Experiment	Number of Trials	Number of Varieties	Laxia	Dromolaxia	Akhera	Athalassa
35/1/E	1	12				
Kantara*	-	-	3	3	0.4	-
Athenais*	-	-	16	22	0.4	-
Range of varieties	-	-	10-50	10-40	0-0.4	-
35/1/D	1	12				
Kantara			2	3	0.4	-
Range of varieties			6-18	8-45	0.4	-
35/1/C	1	12				
Kantara			3	3	0.4	-
Range of varieties			6-22	10-50	0.4	-
35/1/B	1	12				
Kantara			-	5	-	1.4
Range of varieties			-	3-45	-	2-40
35/1/A	21	252				
Kantara			-	3.9	-	2.7
Range of varieties			-	19-65	-	19.62

* Kantara is a recently released variety for the replacement of Athenais.

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CEREAL RUST SITUATION IN NORWAY IN 1982

BY

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Moderate attacks of *Puccinia hordei* were recorded in 1981 on barley around the Oslo fjord. The disease appeared two weeks earlier than usual but the attacks hardly had any impact on yield in most cases.

Trace amounts of *P. striiformis* were found on winter wheat in Hedmark county.

Obituary

Dr. Věra Slovenčíková (1934-1981)

Dr. Věra Slovenčíková was born on 28th February, 1934 and died on 15th October, 1981 in Prague.

After receiving her Ingenieurdiploma she started her scientific career in 1957 at the Research Institute for Cereals in Kroměříž. She was engaged in the research of wheat control and five years later she began her research work on yellow rust of wheat. This was also the topic of her PhD thesis. Since 1970 she continued her yellow rust studies in the Research Institute for Crop Production in Prague-Ruzyně. In the years of yellow rust epidemics in Czechoslovakia in the sixties she carried out the race analyses and study of varietal resistance. The results of her research led to important changes in the list of recommended varieties which reduced substantially the yield losses caused by yellow rust in the following years.
Her research formed a solid base for disease resistance breeding in wheat in Czechoslovakia. In addition to her research activity she cooperated with plant breeders and became co-author of several Czechoslovak wheat cultivars.

Dr. Věra Slovenčíková published over 30 papers on yellow rust epidemics, physiologic specialization, varietal resistance and genetics of resistance, in Czechoslovakia and abroad.

She developed good contacts with cereal rusts specialists from many countries of the world and substantially contributed to the organisation of the European and Mediterranean Cereal Rusts Conference held in Prague in 1972.

Dr. Věra Slovenčíková has been honoured on several occasions for her scientific achievements and public activity. She was a warm, thoughtful and interested person, who divided all her enthusiasm, energy and love between her research activity and her family.