

WHEAT STEM RUST RACES IN THE YAQUI VALLEY
OF MEXICO DURING 1972¹

A. P. Roelfs and D. V. McVey²

In recent years, many institutions with spring wheat breeding programs have planted a winter nursery in the Yaqui Valley near the Ciudad Obregon, Mexico. These nurseries were initiated to increase the number of generations per year, a procedure which often reduced the number of years the material was tested for stem rust resistance in the area for which it was designed to be grown. We conducted a race survey to characterize the virulence combinations of wheat stem rust (*Puccinia graminis* Pers. f. sp. *tritici*) present in the Yaqui Valley nurseries. Vernal was resistant to all cultures while Sr 6 was susceptible to 98% of the isolates. This is the reverse of the hard red spring wheat area of the United States, where Sr 6 has offered resistance and Vernal is susceptible.

MATERIALS AND METHODS

The 100 collections consisted of 66 from wheat, 12 from barley, 5 from durum wheat, 9 from triticale, 3 from rye, and 4 from other grasses from two locations in the Valley. The methods used for handling collections have been described previously (3). The hosts used during the survey are shown in Table 1. The differential series consisted of seven of the Chinese substitution lines (1, 2) and Vernal emmer. A system of codes was designed to describe the various virulence combinations (Table 2). Code RT, for example, designates a culture with a virulence pattern of S, S, R, S on Set 1 (Sr 5, 9d, dlv, and 7b) and S, S, S, S on Set 2 (Sr 11, 6, 8, and 9a).

RESULTS

We made 298 isolations, approximately three per collection. All isolates were virulent on Sr 5 and Sr 9d, and none was virulent on Vernal Sr dlv. The absence of virulence for Vernal, race 15 group, was expected (3, 4). Virulence on Sr 11 was found in 72% of the isolates; Sr 7b, 76%; Sr 9a, 86%; Sr 6, 98%; and Sr 8, 99%. No combination of these genes offers protection,

Table 1. Hosts used in the 1972 wheat stem rust survey of the Yaqui Valley of Mexico.

Variety or line	CI No.	Crop	Variety or line	CI No.	Crop
<u>Identification series</u>			<u>"Universally resistant" series</u>		
Little Club	4066	wheat	<u>Triticum timopheevi</u> sel.		timopheevi
Einkorn	2433	monococcum	Stewart 63	13771	durum
Hypana	11772	barley	Leeds	13168	durum
Prolific	26	rye	Little Club (check)	4066	wheat
Marvellous	7027	oats	Wells	13333	durum
<u>Differential series</u>			Waldron	13958	durum
I Sr 5 Ra	14159	wheat	Rosner	15013	triticale
I Sr 9d Ra	14177	wheat	Prolific	26	rye
Vernal	3686	emmer	Wisconsin 271		wheat
I Sr 7b Ra	14165	wheat	Agent	13523	wheat
I Sr 11 Ra	14171	wheat	Wheat-rye translocation	14134	wheat
I Sr 6 Ra	14163	wheat	Khapli	4013	emmer
I Sr 8 Ra	14167	wheat	<u>Susceptible host</u>		
I Sr 9a Ra	14169	wheat	Little Club	4066	wheat

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²Research Plant Pathologists, Plant Protection Programs, Animal and Plant Health Inspection Service, and Plant Science Research Division, Agricultural Research Service, respectively, U. S. Department of Agriculture, Cereal Rust Laboratory, University of Minnesota, St. Paul, Minnesota 55101.

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Table 2. Key to the coding system for virulence combinations used by the Cereal Rust Laboratory, 1972.

SR gene					SR gene				
Set 1 ^a :	5	9d	dlv	7b	Set 1 ^a :	5	9d	dlv	7b
Set 2 ^b :	11	6	8	9a	Set 2 ^b :	11	6	8	9a
code	host response ^c				code	host response ^c			
B	R	R	R	R	L	S	R	R	R
C	R	R	R	S	M	S	R	R	S
D	R	R	S	R	N	S	R	S	R
F	R	R	S	S	P	S	R	S	S
G	R	S	R	R	Q	S	S	R	R
H	R	S	R	S	R	S	S	R	S
J	R	S	S	R	S	S	S	S	R
K	R	S	S	S	T	S	S	S	S

^aCombinations of host response determines first letter of code. ^bCombinations of host response determines second letter of code. ^cR = host not susceptible; S = host susceptible.

Table 3. Number of rust isolates of each virulence combination identified from different hosts in nurseries in the lower Yaqui Valley, Mexico, 1972.

Host	RT	RK	RS	RH	QS	QT	QF	QK	QJ	Total
Wheat	96	45	3	1	31	20	1	1	1	199
Barley	23	12	0	0	0	0	0	1	0	36
Triticale	11	8	0	1	1	1	5	0	0	27
Durum	9	3	0	0	3	0	0	0	0	15
Other grasses	6	4	0	0	1	1	0	0	0	12
Rye	6	0	0	0	2	0	0	1	0	9

as 51% of the isolates were virulent on all the single genes except Vernal, code RT. A system of 8 differentials with two reaction classes results in 256 combinations, 2⁸. We isolated nine of these possible combinations, that is, RT, RK, RS; RH, QS, QT, QF, QK, and QJ. The virulence combinations of "R_" previously would have been classified as a member of the race 11-32-113 group (76% of the isolates); those of "Q_" would have been in the race 151 group (23% of the isolates).

The host source had little effect on the virulence combinations isolated (Table 3) with the exception of the isolation of QF primarily from triticale. Isolates made from collections obtained from varieties and lines of wheat that did not possess any of the resistance genes used in the differential set showed fewer isolates of RT and slightly more of RK than the nursery average.

No virulence was found for any of the varieties in the "universally resistant" series. These varieties in general represent complex combinations of genes. No *Puccinia graminis* f. sp. *secalis* was isolated. Thus, many genes are available for resistance to these isolates. Resistance at these nurseries does not assure resistance in the USA, due to the absence of race 15. This race comprised 42% of the isolates from the USA in 1971 and has been the most prevalent race each year since 1965.

Literature Cited

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ANIMAL AND PLANT HEALTH INSPECTION SERVICE AND PLANT SCIENCE RESEARCH DIVISION, AGRICULTURAL RESEARCH SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATIVE RUST LABORATORY, ST. PAUL, MINNESOTA