

An Allele for Low Reaction to *Puccinia graminis tritici* in Chinese Spring Wheat

William Q. Loegering

Professor of Plant Pathology, University of Missouri, Columbia 65201.

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Chinese Spring (Chinese) wheat (C.I. 14108) has been used extensively in cytogenetic studies (7) and as a background for lines of wheat monogenic for low reaction (LR) to *Puccinia graminis* Pers. f. sp. *tritici* Erikss. & Henn. (3). For the latter use it is important to know the LR genotype of Chinese.

Sears et al. (8) suggested a gene for LR on chromosome 7A of Chinese, but this has never been confirmed. A gene for low pathogenicity (LP) was identified in the pathogen (4) corresponding to an unknown gene for LR in Chinese. The gene for LP was given the tentative designation *P5*. Later, a gene for LR was identified in Chinese (2) and tentatively designated *Srpl*. The typical low-infection type (2+) for this LP/LR gene combination develops only at temperatures of 18 C or below. In developing near-isogenic lines involving the *Sr9a* gene with Chinese as the background, it was noted that the *sr9a* member of the pair carried a gene for LR to one test culture (3). This indicated that the supposed *sr9a* allele actually was an allele for LR at the *Sr9* locus. Since Chinese was the background, it was suggested that this unexpected LR allele originated in Chinese. This hypothesis has now been tested.

Triticum aestivum L., cultivars Chinese Spring and ISr9a-Ra, (C.I. 14169) (3), and *P. graminis tritici*, cultures 17-51A and 111 × 36 Fl (ATCC PR-4) were used in the study. The two cultivars were crossed and 245 F₃ lines obtained. About 16 seedlings of each F₃ line were inoculated with each of the cultures. ISr9a-Ra:17-51A

and Chinese: 111 × 36 Fl gave low-infection type. ISr9a-Ra:111 × 36 Fl and Chinese:17-51A gave high infection type. Since the low infection type of Chinese:111 × 36 Fl is expressed poorly at the normal greenhouse temperature of 21 C or above, all materials inoculated with culture 111 × 36 Fl were grown at 17 C in a growth chamber.

The results (Table 1) indicate that the gene for LR in Chinese is allelic (or very closely linked) with *Sr9a*. Since the designations *Sr9a*, *-b*, *-c*, *-d*, and *-e* have already been used in the literature (1, 5, 6, 9) (*-c* perhaps incorrectly) the gene in Chinese is designated *Sr9f*. It is suggested that *Srpl* and *P5* are the *9f* genes of host and pathogen, respectively.

Chinese has been used extensively as a background cultivar in the development of wheat lines monogenic for LR to *P. graminis tritici*, of near-isogenic pairs of lines, and of substitution lines. Thus, many of these wheat lines will carry the *Sr9f* allele. Exceptions are lines homozygous for any of the other *Sr9* alleles, and at least some substitution lines with chromosome 2B as the donated chromosome. Nearly all cultures of *P. graminis tritici* collected in the field have the *psr9f* genotype, thus the presence of *Sr9f* would go unnoticed if Chinese-background wheat lines were used in genetic and physiological studies of stem rust of wheat.

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TABLE 1. Reactions to *Puccinia graminis* f. sp. *tritici* cultures 17-51A and 111 × 36 Fl of F₃ families from the cross of wheat lines ISr9a-Ra (C.I. 14169) and Chinese Spring (C.I. 14108)

Culture 111 × 36 Fl ATCC PR-4	Culture 17-51A			Total
	Homozygous high	Hetero- zygous	Homozygous low	
	Number of F ₃ families			
Homozygous high	77	77
Heterozygous	...	112	...	112
Homozygous low	56	56
Total	56	112	77	245

P = .05 - 0.10 for a 1:2:1 ratio.