

## Susceptibility of Triticale, Rye, and Wheat to Stem Rust from these Three Hosts

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### ABSTRACT

The characterization of the stem rust occurring on *Triticale* was attempted by collecting spores of stem rust from *Triticale*, wheat and rye and inoculating them separately on seedlings of these hosts. Eleven out of 19 isolates from *Triticale* produced a susceptible reaction on some lines of *Triticale* and certain varieties of wheat and rye. The other eight isolates produced a resistant reaction on both rye and *Triticale*; whereas, on wheat the varietal reactions recorded involved resistance as well as susceptibility. Behavior of three races of *Puccinia graminis tritici* on the lines of *Triticale*, and varieties of wheat and rye was similar to that encountered with the isolates coming from *Triticale*. On the contrary the isolates from rye differed in virulence pattern from the races of *P. graminis tritici* and *P. graminis* isolates from *Triticale* on all three hosts. Nine out of 10 isolates from rye did not produce susceptible reaction on any of the varieties of wheat and lines of *Triticale*, but did produce differential reactions on rye. Only one isolate from rye behaved as *P. graminis secalis* when inoculated to the varieties of rye, but as *P. graminis tritici* when inoculated to the varieties of wheat, and was capable of producing susceptible reaction on the lines of *Triticale*.

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*Additional key words:* virulence genes.

The early studies of Stakman (2) and Stakman et al. (3, 4, 5), showed that *Puccinia graminis tritici* attacks wheat, barley, several grasses, and to a certain extent, rye. *P. graminis secalis* is able to attack rye, barley, and several grasses, but it would infect wheat only under extremely special conditions (1).

This investigation was undertaken to determine which form of *P. graminis* is responsible for attacking *Triticale*.

**MATERIALS AND METHODS.**—Thirty-one lines of hexaploid and six lines of octaploid *Triticale*, 23 varieties of wheat, and 31 varieties of rye were tested.

Nineteen single-pustule isolates from *Triticale*, three from wheat (subsequently identified as *Puccinia graminis tritici* races 12, 15, and 151), and 10 isolates from rye were used. All three hosts were inoculated at the first-leaf stage with each isolate following the usual technique.

The readings of the infection types were taken 12 to 14 days after inoculation according to the method proposed by Stakman and Levine in 1922 (4).

**RESULTS.**—Eleven isolates out of the 19 from *Triticale* were able to attack *Triticale*, wheat and rye causing moderately susceptible to very susceptible reaction on some entries of all three types of hosts (Table 1).

TABLE 1. Reaction types produced by *Puccinia graminis* isolates from *Triticale*, wheat, and rye on certain lines and varieties of *Triticale*, wheat, and rye

Source of isolates	No. of isolates	Reaction on		
		Wheat	<i>Triticale</i>	Rye
<i>Triticale</i>	11	S <sup>a</sup>	S	S
<i>Triticale</i>	8	S	S	R
Rye	9	R <sup>b</sup>	R	S
Rye	1	S	S	S
Wheat	3	S	S	S

<sup>a</sup> At least some of the entries were susceptible.

<sup>b</sup> None of the entries was susceptible.

Eight isolates out of the 19 from *Triticale* were virulent only on *Triticale* and wheat.

All three races of *Puccinia graminis tritici* collected from wheat were able to attack all three hosts, whereas only one isolate out of 10 from rye was able to attack the varieties of rye, wheat, and *Triticale* (Table 1). Other *P. graminis* isolates from rye were only virulent on rye.

DISCUSSION.—The isolates of *Puccinia graminis* collected from *Triticale* used in this study were typical of the special form *P. graminis tritici*, since they were able to attack rye besides *Triticale* and wheat. Some isolates were only virulent on *Triticale* and wheat. These results are in agreement with the pathogenic ability established for *P. graminis tritici* by early investigators (3).

One of the isolates of *P. graminis* from rye attacked varieties of rye; and, in addition, produced moderately susceptible to susceptible reaction on the varieties of wheat and *Triticale*.

The pathogenic ability of this particular isolate of rye is comparable to the 11 isolates from *Triticale* and three isolates from wheat. This behavior of the rye isolate could be explained on the basis of genetical recombination between the forms *P. graminis tritici* and *P. graminis*

*secalis*, as has been found by Watson and Luig (6). On the contrary, all other isolates of *P. graminis* collected from rye, were only virulent on rye confirming their identity to the special form *P. graminis secalis*.

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