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COLORED MUTANTS OF *Puccinia*
Striiformis WEST

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ABSTRACT

A natural mutation of Puccinia striiformis, West, that produced white pustules rather than the normal orange pustules has been investigated. The mutant is morphologically indistinguishable from the parent race, has the same infective characteristics, germinates normally, and has held its white color through many host passages. A somewhat increased virulence is evident. Two other strains, cream and yellow, have been obtained from the mutant, and these also possess the identifying characteristics of the parent race and the white mutant. Comparative data on the reactions of several host wheat varieties to the normal race, the white mutant, and the two segregants are presented.

In March 1961, during the routine examination of greenhouse plants that had been inoculated with various races of stripe rust, a group of white pustules was noticed on one pot of plants that had been inoculated with race 2 of Puccinia striiformis, West. The plants and the inoculum had not been treated in any special manner. Therefore, it was assumed that the white pustules were the result of a natural mutation.

Microscopic examination of the spores taken from the white pustules, revealed that they were morphologically indistinguishable from the orange spores of the "parent" race. It was also determined that the spores from the mutant germinated in the same manner and as well as those from the original culture.

In general, it has been recorded from other cases that off-color mutants are frequently quite difficult to maintain. However, the maintenance of this white mutant has been no problem, since its requirements for infection have not changed and it is as infective as the parent race. On the other hand, the virulence of the mutant seems to be greater than that of the parent race. There have been no controlled tests to substantiate this, but for over a year, observations have indicated that plants inoculated with the white race are killed sooner than those similarly infected with the normal Race 2.

The basis for the identification of stripe rust reaction type is analogous to that for stem rust. Differences in pustule size, shape, and number are designated by different legends. (Table I) In the area of "0; through 0+" there is increasing necrotic and chlorotic development; from "1 through 4", necrosis is not evident and there is a region of decreasing chlorosis accompanied by the increase in number of pustules. The white mutant and the original Race 2 were cultured on differential varieties on several different occasions. Each time the reactions of the two cultures were identical (Table II).

After the mutant was isolated, it was expected that it would begin to segregate. This did not take place. The culture held its white color for over a year, during which time it was repeatedly passed through the host variety, Baart wheat. In November, 1962, however, color changes were noted on plants inoculated with this culture. Single pustule isolations were made from these off-color areas, with the result that three different strains - white, cream, and yellow - of the original culture - have been obtained. These segregants still possess the same racial reaction pattern as the original white mutant and the parent race. (Table III)

It is felt that this color mutant of Race 2 shows a high degree of stability because even though there has been some segregation recently, there has been no tendency to revert to the orange color of the parent race.

TABLE I. LEGENDS USED IN IDENTIFYING
SUSCEPTIBILITY TO STRIPE RUST RACES

<u>Symbol</u>	<u>Legend</u>
i	immune
0;	resistant (small flecks)
0	resistant (large chlorotic areas)
HSR	hypersensitive resistance (large chlorotic and/or necrotic areas, sometimes giving a bleached appearance to the leaf)
0+)	
1)	somewhat resistant to somewhat
2)	susceptible
3	susceptible
4	susceptible

TABLE II. REACTIONS OF SELECTED DIFFERENTIAL VARIETIES TO THE WHITE MUTANT OF RACE 2 AND TO NORMAL RACE 2 OF PUCCINIA STRIIFORMIS, WEST

<u>Variety</u>	<u>Race 2</u>	<u>White Mutant</u>
Michigan Amber	2	2
Ble rouge d'Ecosse	1	1
Strubes Dickkopf	2	2
Webster	HSR	HSR
Holzapfels Fruh	3	3
Vilmorin 23	0	0
Heines Kolben	0;	0;
Carsten V	0	0
Spaldings Prolific	0	0
Chinese 166	0;	0;
Rouge prolifique barbu	0	0

TABLE III. REACTIONS OF SELECTED DIFFERENTIAL VARIETIES TO THE SEGREGANTS OF THE WHITE RACE 2 AND TO NORMAL RACE 2 OF PUCCINIA STRIIFORMIS, WEST

<u>Variety</u>	<u>Race 2</u>	<u>Race 2W-W¹</u>	<u>Race 2W-C²</u>	<u>Race 2W-Y³</u>
Michigan Amber	2	2	2	2
Ble rouge d'Ecosse	1	1	1	1
Strubes Dickkopf	2	2	2	2
Webster	HSR	HSR	HSR	HSR
Holzapfels Fruh	3	3	3	3
Vilmorin 23	0	0	0	0
Heines Kolben	0;	0;	0;	0;
Carston V	0	0	0	0
Spaldings Prolific	0	0	0	0
Chinese 166	0;	0;	0;	0;
Rouge prolifique barbu	0	0	0	0

1. White mutant
2. Cream segregant of white mutant
3. Yellow segregant of white mutant