

## 2019-2022

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### INTRODUCTION

Wheat yellow rust (Yr), caused by *Puccinia striiformis* f. sp. *tritici* (Pst), is one of the most important diseases threatening global wheat production. In Argentina, it has become the main disease of wheat since the arrival of new races to the Southern Cone area, which affect most of the varieties sowing in our country. The objective of the study was to identify avirulence/virulence phenotypes of the Pst population and identified effective Yr genes.

### MATERIALS Y METHODS

Samples were collected in wheat-growing areas during the period 2019-2021, from experimental and farmers' fields, and then tested on Avocet near-isogenic lines and some local varieties (Var).



### RESULTS

Table 1: Yr genes and genotypes tested

| Yr | Genotypes     | Yr | Genotypes       |
|----|---------------|----|-----------------|
| A+ | Avocet+YrA    | CV | YrCV/6*AOC      |
| 1  | Yr1/6+AOC     | 5  | Yr5/6*Avocet S  |
| 3  | Tatara        | 6  | Yr6/6*Avocet S  |
| 8  | Yr8/6*AOC     | 7  | Yr7/6*Avocet S  |
| 10 | Yr10/6*AOC    | 9  | Yr9/6*Avocet S  |
| 24 | Yr24/3*AOC    | 15 | Yr15/6*Avocet S |
| 26 | Yr26/3*AOC    | 17 | Yr17/6*Avocet S |
| 27 | Yr27/6*AOC    | 12 | Yr12/3*Avocet S |
| SP | YrSP/6*AOC    | SK | YrSK/3*Avocet S |
|    | Var Algarrobo |    | Var Warrior     |
|    | Var Bag. 750  |    | Var Arial       |



Table 3: Frequency of virulence of isolates on Yr genes

| Yr genes and varieties | % virulence |      |      |
|------------------------|-------------|------|------|
|                        | 2019        | 2020 | 2021 |
| SP                     | 0           | 0    | 44   |
| LG Arial               | 0           | 0    | 20   |
| Baguette 750           | 21,7        | 0    | 50   |
| 5                      | 0           | 0    | 0    |
| 10                     | 0           | 0    | 0    |
| 15                     | 0           | 0    | 0    |
| 24 *                   | 0           | 0    | 0    |
| 26 *                   | 0           | 0    | 0    |
| * intermediate IT      |             |      |      |

Table 2: formula genes effectives / genes ineffective. Main races 2021

| Genes Effectives / Genes Ineffective   |
|--|
| Yr5, 8, 10, 15, 24, 26 / Yr Av+, 1, Tatara, 6, 7, 9, 12, 17, 27, SK, CV, SP, Algarrobo, Bag. 750, Warrior, Arial |
| Yr5, 8, 10, 15, 24, 26, Arial / Yr Av+, 1, Tatara, 6, 7, 9, 12, 17, 27, SK, CV, SP, Algarrobo, Bag. 750, Warrior |
| Yr 1, Tatara, 5, 10, 15, 24, 26, SK, SP, Bag750, Warrior, Arial / Yr Av+, 6, 7, 8, 9, 12, 17, 27, CV, Algarrobo  |

Genes Yr5, Yr10, Yr15, Yr24, Yr26 and Var Arial were effective in all isolates during the 3 years, indicating their effectiveness against the Argentinian Pst populations. Furthermore, the YrSP gen was effective in 2019. In 2020, the Pst population showed a lower virulence, and genes Yr1, Yr3 and Var. Baguette 750, Warrior and Arial were resistant. Likewise, in 2021 a new race virulent to YrSP and Var Arial was identified, with 20% of frequency. Moreover, 26% of isolates assayed were virulent on Var. Baguette 750 but avirulent on Var. Arial. Same race was 21.7% frequency in the year 2019.

This work reports the virulence of the Argentinian Pst population, the emergence of new races and some effective genes useful for breeding. National and private wheat breeding programs are working to improve resistance in local varieties, with the strategy of adding major and slow rusting genes.