

# Wheat Yellow Rust Status In Egypt; The emergence and changing of virulence races of *Puccinia* striiformis f. sp. tritici



Technical Worksho

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#### Introduction

Wheat (Triticum aestivum L.) is a major winter crop and an essential source of carbohydrates and multiple nutrients, serving as a dietary food in Egypt. The importance of stripe (yellow) rust, caused by Puccinia striiformis f. sp. tritici (Pst), has increased destructively worldwide during the last decades in wheat (Triticum aestivum). In addition, the detection of the new races indicated continual changes of virulence in the Pst pathotypes population in Egypt. Virulence to resistance genes Yr5 and Yr15 were not found in any of the growing seasons. Genes such as Yr1, Yr6, Yr7, Yr8, Yr9, Yr17, Yr18, Yr25, Yr27, Yr28, Yr31, Yr32, and YrSp showed different infection types ranging from moderately resistance to susceptible. In addition, a race very similar to the "Warrior" race with virulence to Yr1, Yr2, Yr3, Yr4, Yr6, Yr7, Yr9, Yr17, Yr25, Yr32, YrSp and YrAmb was also confirmed in the 2015/2016 growing season (Shahin 2020). The objective of this study was to characterize the virulence races of the stripe rust pathogen in Egypt from 2001 to 2021. In addition, Egyptian cultivars were evaluated for resistance to selected Pst races at both seedling and adult-plant stages to provide useful information for breeding resistant cultivars and managing the disease.

## **Materials and Methods**

The present investigation was performed under both greenhouse and field conditions of the Department of Wheat Disease Research, at the Sakha Agriculture Research Stations, Plant Pathology Research Institute (PPRI), Agricultural Research Center (ARC), Egypt. To identify races of Pst collections samples using the standard World/European group of wheat differential hosts adopted by Johnson et al., (1972). Also, used a new modern concept of race identification and genetic group.

## **Results and Discussion**

The wheat differential hosts at both seedling and adult-plant stages showed a wide range of rust responses during the 2001 to 2021 growing seasons are presented in Fig. 1 and Table 1.

## Pathogenic variabilities: race analysis

- *Yr9* (1990).
- Yr27 aggressive race since 2010.
- Yr32 race 2014.
- Warrior race since 2015 (Shahin 2020).

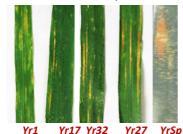


Fig. 1. Responses of wheat genotypes carrying stripe rust

resistance genes (Yr's).

Table 1. The adult plant field response to stripe rust under field condition for the Egyptian bread wheat cultivars.

	Rust Response					
Cultivar	Old race	Yr27	New race	New aggressive Race		
Misrl	R	R-MR	5MR	MSS		
Misr2	R	R-MR	10S	20S		
Misr3	0	0	0	TR		
Giza167	R	MS	MRMS	5MS		
Giza 168	R-MR	MRMS	20S	20S		
Giza 171	R	MRMS	5MS	TS		
Sakha 61	R	R-MR	MR	5S		
Sakha93	MR	10MS	30S	40S		
Sakha94	MR.	MR.	TMS	20MSS		
Sakha95	R-MR	MRMS	TMS	30MSS		
Gemmeiza9	MRMS	MR.	10MS	10MS		
Gemmeiza10	MR.	MR-MS	MR-MS	5MS		
Gemmeiza11	R-MR	MS	10S	30S		
Gemmeiza12	R	R	MR	10MS		
Sids1	MR.	MR.	MRMS	10S		
Sids12	MR	10MSS	30S	50S		
Sids13	R	MRMS	20S	20S		
Sids14	R-MR	MRMS	30MSS	50MSS		
Shandaweel 1	R	MR	MS	30MSS		

Yellow rust- new aggressive race in Egypt						
Genotypes		Old Race	New Race Yr27 pt.	Old Race	New Aggressive Race	
	Resistance genes	Scores 0-9 scale	Scores 0-9 scale	Scores	Scores	
Chinese 166	YrI	0	0	0	5S	
Lee	Yr7, +	7	7	50S	30S	
Heines Kolben	Yr 6.(Yr2)	7	7	20S	10MS	
Vilmorin 23	Yr 3+	1	1	?	10MS	
Moro	Yr 10	1	1	10R	5S	
Strubes Dickkopf	Yr Sd, Yr25	7	7	T-10MR	10MS	
Suwon 92*Omar	Yr SÚ	2	7	0	30S	
Clement (W-Kışlık)	Yr9+, Cle	3	3	5MR	5MR	
Triticum spelta album	Yr5	0	0	0	0	
Hybrid 46	Yr4+	1	1	0	R.	
Reichersberg 42	(W:Yr7+?)	6	6	0	10MS	
Heines Peko	Yr6, Yr2, Yr25,+	7	6	5R	20MR	
Nord Desprez	3N	1	2	5MR	R	
Compair	Yr8, +	7	7	0	R	
Carstens V	Yr32, Yr25, +	0	1	0	5MS	
Spaldings Prolific	SP	0	0	0	5S	
Heines VII	Yr2, Yr25+	7	7	5R	5R	
Yr17/6*Avocet S	Yr17	5	?	MRMS	10S	
Ciano	Yr27	5	8	20MS	30S	
Opata 85	Yr27,Yr18	5	7	10MR	10MSS	
Yr32/6*Avocet S	Yr32	0	?	0	30S	

## Selected Reference

Johnson R, Stubbs RW, Fuch E, Chamberlain NH. (1972). Nomenclature for physiologic races of *Puccinia striiformis* infecting wheat. Tran Br Mycol. Soc. 58(3):475–480.

Shahin, A.A. (2020). Occurrence of new races and virulence changes of the wheat stripe pathogen  $(Ps\bar{t})$ in Egypt, Archives of Phytopathology and Plant Protection, Vol. 53, No. 11-12, 552-569.