

# Screening for resistance to septoria tritici blotch, the major wheat disease in Western Europe

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## Introduction

Septoria tritici leaf blotch (STB) caused by *Mycosphaerella graminicola* is one of the most devastating diseases in Europe and approximately 600 M€ is annually spent on the chemical control of it in Western Europe. The most efficient way to control STB is to breed resistant cultivars and in recent years 15 major resistance genes (*Stb1-Stb15*) were identified.

## Material and Methods

We evaluated 104 cultivars, including a differential set representing 15 mapped *Stb* genes and cv. Taichung 29 as susceptible check, with 54 *M. graminicola* isolates in three independent replicated trials. Analyses were carried out using first leaf data (% pycnidia) at 21 days after inoculation.

## Results

None of the *Stb* genes is effective to all *M. graminicola* isolates. However, CS Synthetic (6x) is the most resistance cultivar against French isolates and TE9111 and Arina are the most resistant cultivars of the differential set in the screening with 18 *M. graminicola* bread wheat isolates representing a global range of pathogenicity (Table1). Exploitation of the virulence spectrum of *M. graminicola* isolates helped us to identify potentially new sources of resistance to STB including a breeding line derived from a synthetic hexaploid line, which was resistant to all highly aggressive isolates (Figure1).

## Conclusion

Broad spectrum screening of wheat germplasm with *M. graminicola* isolates is a necessity to evaluate and characterize resistance genes. We have started mapping studies aiming at marker development enabling rapid and efficient deployment of new source of resistance in practical breeding programs.

**Table1. Responses of STB differential cultivars with mapped *Stb* genes to a global set of *M. graminicola* isolates.**

0 =No pycnidia , P% ≤20 ■ , 20< P% ≤ 40 ■ , P%>40 ■

		Bulgaria	Veranopolis	Israel 493	Tadinia	CS/synthetic	Shafir	Estanzuela Federal	M6 Synth(w7984)	Countot	Kavkaz - K4900	TE9111	Salamouni	Arina	Taichung 29	
		<i>Stb1, 5BL &amp; Stb6</i>	<i>Stb2, 3Bs &amp; Stb6</i>	<i>Stb3, 7As &amp; Stb6</i>	<i>Stb4, 7Ds</i>	<i>Stb5, 7Ds</i>	<i>Stb6, 3As</i>	<i>Stb7, 4AL</i>	<i>Stb8, 7BL</i>	<i>Stb9, 2B</i>	<i>Stb10(1D), Stb12(1), 4AL, &amp; Stb6 &amp; 7</i>	<i>Stb11, 1Bs &amp; Stb6 &amp; Stb7</i>	<i>Stb13, 7BL &amp; Stb14, 3Bs</i>	<i>Stb15, 6As &amp; Stb6</i>	Susceptible Check	Distinguish <i>Stb</i> -gene effect in multi- <i>Stb</i> gene cultivars Green = isolate specific Black= low Pycnidia (P ≤ 5%)
Algeria	IPO95054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2, 3, 7, 11, 10, 12, 15
	IPO0003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2, 3
USA	IPO 00005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 10, 12, 15
Turkey	IPO 86013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2, 3, 11, 15
	IPO 86068	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb3, 7, 11, 10, 12, 15
Argentina	IPO 99015	0	0	0	0	0	0	0	0	67	0	0	0	0	0	Stb1, 2, 3, 11, 15
Uruguay	IPO 87016	0	0	0	35	0	0	0	0	0	0	0	38	0	0	Stb3, 7, 11, 10, 12, 15
Ethiopia	IPO 88018	0	0	0	0	0	0	52	0	0	0	0	0	0	0	Stb3, 11, 10, 12, 15
Mexico	IPO 90006	0	0	0	0	0	0	0	0	0	29	0	0	0	0	Stb1, 2, 3, 11, 15
Peru	IPO 90015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 3, 7, 11
Portugal	IPO 92004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb11, 15
Syria	IPO 95036	21	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 11, 15
Ethiopia	IPO 88004	0	0	0	0	0	0	83	0	0	0	0	0	0	0	Stb1, 3, 11, 15
Canada	IPO 94218	0	0	0	0	31	0	0	0	0	0	0	0	0	0	Stb1, 3, 11, 15
Algeria	IPO 92034	0	0	30	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2, 15
Netherlands	IPO 89011	42	0	0	0	0	0	0	0	2	0	21	0	13	0	Stb1, 15
	IPO 02166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 3, 11, 15
Iran	IPO 02159	0	0	0	0	0	3	0	0	0	0	0	0	0	0	Stb1, 2, 15
	IPO 323	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
Netherlands	IPO 94269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 88021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb3, 10, 12
	IPO 98022	26	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2
	IPO 98031	0	0	0	0	0	0	0	0	21	0	0	0	0	0	Stb2, 3
	IPO 98032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb3, 10, 12
	IPO 98033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 98034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3
	IPO 98035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb3, 10, 12
	IPO 98038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 88042	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 88046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 88047	37	0	36	0	13	0	54	0	0	0	31	0	0	0	Stb1, 2, 11, 10, 12
	IPO 98050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 98051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 98057	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 98072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3, 11, 10, 12
	IPO 98075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb10, 12
	IPO 98076	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2
	IPO 98078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3
	IPO 88084	0	0	0	34	0	0	64	74	0	0	67	0	0	0	Stb2, 3, 10, 12
	IPO 88097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb1, 2
	IPO 88099	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3
	IPO 89013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3, 10, 12
	IPO 99018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3
	IPO 99031	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3, 10, 12
	IP 0 89032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3
	IP 0 99036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3, 10, 12
France	IPO 93048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Stb2, 3, 10, 12



Fig 1: Response of FD 02112 to a global set of *M. graminicola* isolates