

## NEW ELICITORS AS BIOCONTROL TOOLS TO PROTECT WHEAT AGAINST SEPTORIA TRITICI BLOTCH

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### OBJECTIVES

Elicitors consist of all signals perceived by plants and inducing a defensive reaction. They are considered as promising **biological control** tools for **Integrated Plant Management (IPM)** strategies. Up to now, few elicitors have been efficiently and specifically designed to protect **wheat** against major diseases threatening both its yield and quality.

This project focuses on the **screening of 9 potential elicitor molecules** of various origins and structures (labelled 'EGL' 1 to 9) to protect winter wheat against *Zymoseptoria tritici*, responsible for Septoria Tritici Blotch (STB). In addition, the direct **biocide activity** of these molecules was evaluated *in vitro* on both spore germination and fungal growth.

### MATERIALS AND METHODS

The winter wheat variety 'Avatar' is susceptible to the disease and was grown under greenhouse conditions.

#### PROTECTION EFFICACY

- **Elicitor treatment:** plants at 3-4 leaf stage were sprayed with 30mL of the various molecules, tested respectively at **3 different concentrations**, C1 being the smallest concentration. Control plants were treated with water only. Control treatments consisted of BION® (Syngenta) and the Epoxiconazole® fungicide (BASF).
- **STB inoculation:** Five days after treatment, all the plants were inoculated with a 30mL spore suspension ( $10^6$  spores.mL<sup>-1</sup>) of the *Zymoseptoria tritici* strain 'TO1187'. Controls plants were treated with sterile water amended with 0,05% Tween 20.
- **Disease severity** was scored at 28 days post-inoculation by assessing the percentage of 3rd leaf area covered with lesions (necrosis + chlorosis) as well as pycnidium density within the scored lesions.

#### IN VITRO BIOCIDAL ACTIVITY

- **Fungal spotting tests:** Fungal aliquots of 5µL ( $5.10^5$  spores.mL<sup>-1</sup>) were spotted on PDA plates amended with various concentrations of the elicitor molecules, D1 being the smallest. After incubation for 10 days at 18°C, the colony diameters were measured for each spot (3 plates with 5 spots/plate as replicates).
- **Spore germination tests:** Fungal aliquots of 0,6mL ( $10^4$  spores.mL<sup>-1</sup>) were sprayed on elicitor amended PDA plates (3 plates as replicates). The percentage of germinated spores was scored after 2 days.

The best elicitors were chosen, based on their protection efficacy, and biocide activities, along with other criteria listed in Table 1.



### CONCLUSION & PERSPECTIVES

The 2 best elicitors chosen for further studies are:

- **EGL1** at the highest concentration C3
- **EGL4** at the mid-concentration C2

Next experiments will investigate the triggered signalling pathways in the plant (RT-qPCR and spectrophotometry measurements)

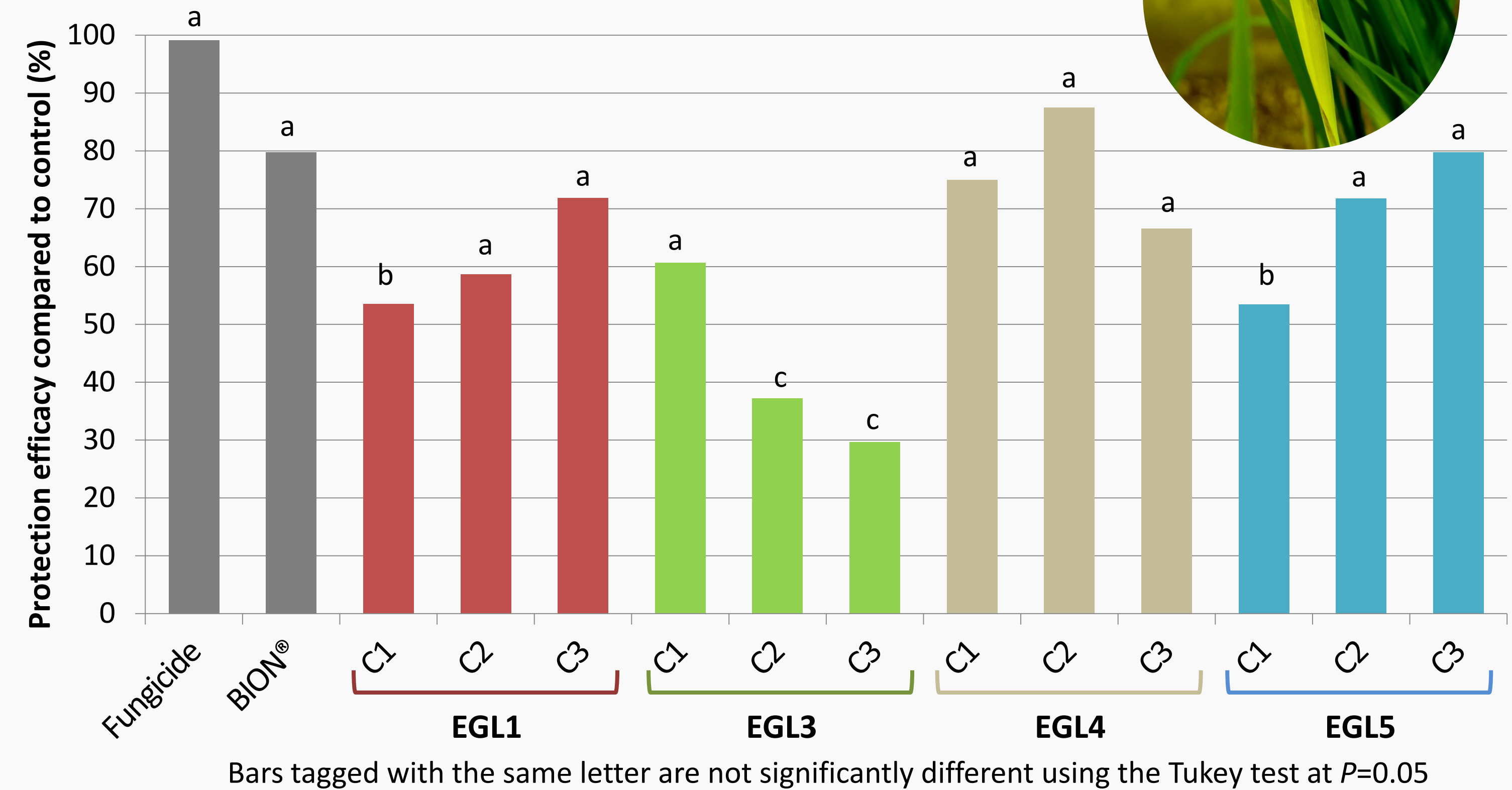


Figure 1. Example of a screening test of elicitors EGL1, EGL3, EGL4 and EGL 5 Control plants showed 35% mean infection on 3rd leaf surface

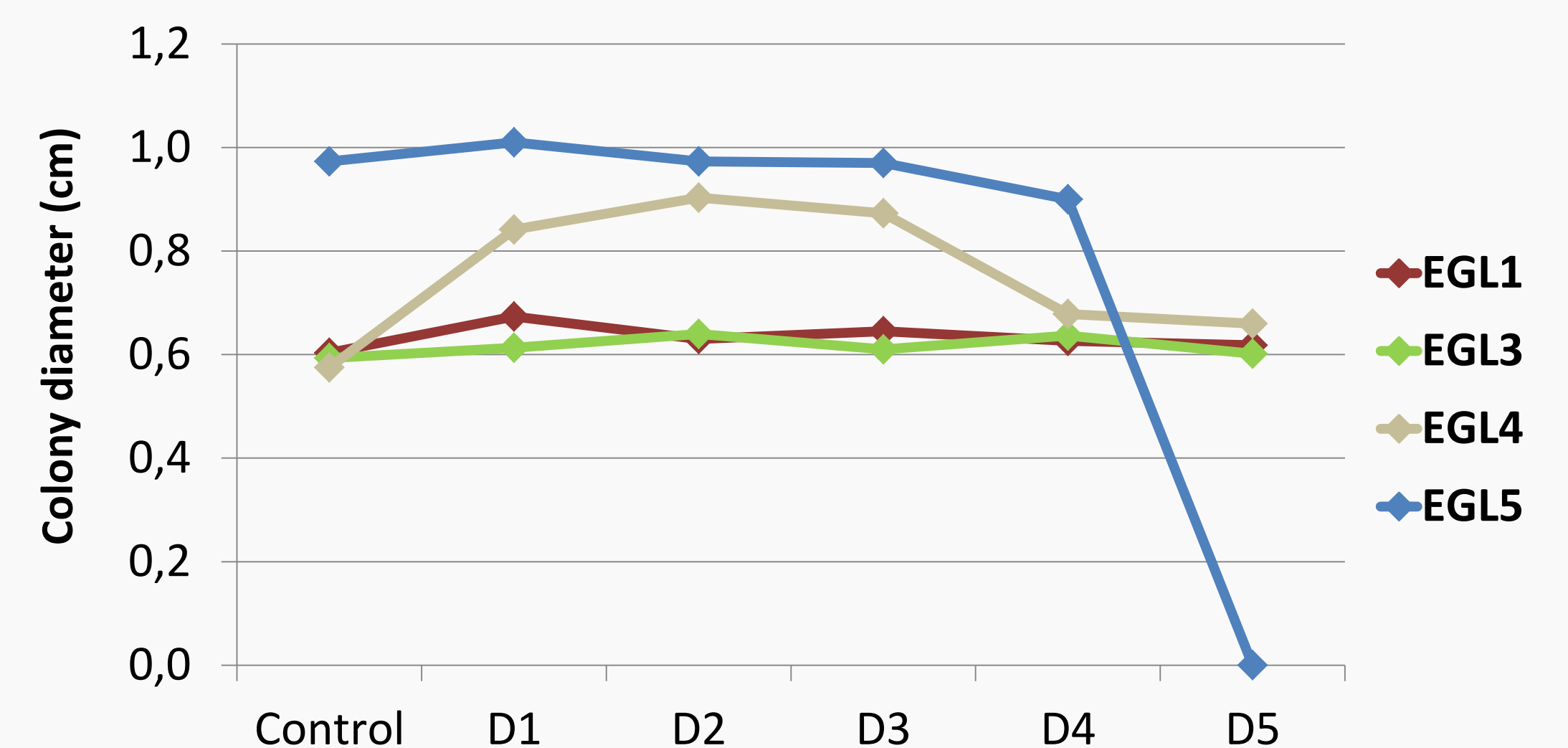


Figure 2. *In vitro* biocidal effect of elicitors EGL1, EGL3, EGL4 and EGL5 on *Zymoseptoria tritici* fungal growth on PDA medium

Table 1. Selection criteria of the 2 best elicitors

	Concentration	Protection efficacy	Biocide activity	Reliability	Easy Formulation	Originality	Market availability
EGL1	C1	++	No	✓	✓	✓	✓
	C2	+++					
	C3	+++					
EGL2	C1	+++	No	✓	✗	✓	✗
	C2	++					
	C3	+++					
EGL3	C1	++	No	✓	✓	✓	✗
	C2	++					
	C3	++					
EGL4	C1	++	No	✓	✓	✓	✓
	C2	+++					
	C3	++					
EGL5	C1	++	Yes at C3	✗	✓	✓	✓
	C2	++					
	C3	++					
EGL6	C1	++	Yes at C3	✗	✓	✗	✓
	C2	++					
	C3	+++					
EGL7	C1	+++	No	✗	✓	✓	✓
	C2	++					
	C3	+					
EGL8	C1	NA	Yes at C3	✗	✗	✓	✓
	C2	NA					
	C3	NA					
EGL9	C1	++	No data	✗	✗	✓	✗
	C2	+++					
	C3	+++					

Protection efficacy cotations: 0% '0'; 1-9% '+/-'; 10-39% '+'; 40-59% '++'; 60-79% '+++'; 80-100% '++++'