Effect on barley genotypes (*Hordeum vulgare* L.)

The interaction between the fungal pathogens under combined stress treatment at the plant interface

Stress 1: Inducer *isolates-Bipolaris maydis* and *Septoria nodorum*
Stress 2: Challenger isolates- *Drechslera* f. *teres*, *Bipolaris sorokiniana*, *Erysiphe graminis* f. sp. *hordei*, *Rhynchosporium secalis*
Stage of plant: 14 days old plant

The table shows the effect of non-barley pathogens *B. maydis* and *S. nodorum* (inducer) on barley pathogens *D. teres*, *R. secalis*, *B. sorokiniana* and *E. graminis* (challenger) on percentage reduction of disease score and percentage reduction of lesion length in barley cultivar Canor Carlsberg

Effect of inducer inoculation on subsequent infection by *D. teres* on second developed leaf					
Cultivar	**Treatment**	**Response under combined stress (Type B parameter*)**			
		Mean disease Score	**Reduction of disease score (%)**	**Average lesion length (mm)**	**Reduction of lesion length (%)**
Canor Carlsberg	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.3	43.5	1.4	48.1
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.7	26.1	2.4	11.1
	D. teres (400 conidia/mL)	2.3	--	2.7	--
Lenka	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.2	53.8	1.3	27.8
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.3	50	1.3	27.8
	D. teres (400 conidia/mL)	2.6	--	1.8	--
Effect of inducer inoculation on subsequent infection by *D. teres* on fourth developed leaf					

Cultivar	Treatment	Mean disease Score	Reduction of disease score (%)
Canor Carlsberg	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.5	65.1
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.5	41.9
	D. teres (400 conidia/mL)	43	--
Lenka	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1	69.7
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.5	54.5
	D. teres (400 conidia/mL)	3.3	--
Ermo	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2	50
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.5	37.5
	D. teres (400 conidia/mL)	4	--
Frost	*B. maydis* (2×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1	56.5
	S. nodorum (2×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.8	21.7
	D. teres (400 conidia/mL)	2.3	--
Effect of low concentration of the inducers on *D. teres* infection on second developed leaf			
Cultivar	**Treatment**	**Mean Disease Score**	**Reduction of disease score (%)**
Canor Carlsberg	*B. maydis* (10^3 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	4.9	0
	B. maydis (7.5×10^3 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	3.6	26.5
	B. maydis (1.5×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	3	38.8
	S. nodorum (10^5 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.3	46.5
	S. nodorum (7.5×10^5 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.7	37.2
	S. nodorum (1.5×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.5	65.1
	B. maydis (0 conidia/mL) + *D. teres* (400 conidia/mL)	4.9	--
	S. nodorum (0 conidia/mL) + *D. teres* (400 conidia/mL)	4.3	--
Lenka	*B. maydis* (10^2 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	6.5	8.5

	B. maydis (7.5×10^3 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.9	59.2
	B. maydis (1.5×10^4 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.3	67.6
	S. nodorum (10^5 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.8	34.9
	S. nodorum (7.5×10^5 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	2.3	46.5
	S. nodorum (1.5×10^6 conidia/mL) + *D. teres* (400 conidia/mL) (Sequential stress)	1.8	58.1
	B. maydis (0 conidia/mL) + *D. teres* (400 conidia/mL)	7.1	--
	S. nodorum (0 conidia/mL) + *D. teres* (400 conidia/mL)	4.3	--
Effect of different inducer incubation periods on *D. teres* infection on second developed leaf			
Cultivar	**Treatment**	**Mean disease Score**	**Reduction of disease score (%)**
Canor Carlsberg	*B. maydis* (2×10^4 conidia/mL) incubated for 2 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.5	30.55
	B. maydis (2×10^4 conidia/mL) incubated for 8 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.8	50
	B. maydis (2×10^4 conidia/mL) incubated for 24 hr.+ *D. teres* (Sequential stress)	1.5	58.33
	B. maydis (2×10^4 conidia/mL) incubated for 54 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.8	50
	B. maydis (2×10^4 conidia/mL) incubated for 78 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.8	50
	D. teres (400 conidia/mL)	3.6	--
	S. nodorum (2×10^4 conidia/mL) incubated for 2 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	3.5	0
	S. nodorum (2×10^4 conidia/mL) incubated for 8 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	5	0
	S. nodorum (2×10^6 conidia/mL) incubated for 24 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	3	11.76
	S. nodorum (2×10^6 conidia/mL) incubated for 54 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.5	26.47

	S. nodorum (2×10^6 conidia/mL) incubated for 78 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.5	26.47
	D. teres (400 conidia/mL)	3.4	--
Lenka	*B. maydis* (2×10^4 conidia/mL) incubated for 2 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.5	46.80
	B. maydis (2×10^4 conidia/mL) incubated for 8 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.4	48.93
	B. maydis (2×10^4 conidia/mL) incubated for 24 hr.+ *D. teres* (Sequential stress)	1.3	72.34
	B. maydis (2×10^4 conidia/mL) incubated for 54 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.3	72.34
	B. maydis (2×10^4 conidia/mL) incubated for 78 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.4	70.21
	D. teres (400 conidia/mL)	4.7	--
	S. nodorum (2×10^4 conidia/mL) incubated for 2 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.5	40.47
	S. nodorum (2×10^4 conidia/mL) incubated for 8 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	4.5	0
	S. nodorum (2×10^6 conidia/mL) incubated for 24 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.8	33.34
	S. nodorum (2×10^6 conidia/mL) incubated for 54 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	2.3	45.23
	S. nodorum (2×10^6 conidia/mL) incubated for 78 hr.+ *D. teres* (400 conidia/mL) (Sequential stress)	1.8	57.14
	D. teres (400 conidia/mL)	4.2	--

Effect of inducer inoculation on subsequent infection by barley pathogens *B. sorokiniana, E. graminis* and *R. secalis* on second developed leaf

Cultivar	**Treatment**	**Mean disease Score**	**Reduction of disease score (%)**
Canor Carlsberg	*B. maydis* (2×10^4 conidia/mL) + *B. sorokiniana* (4×10^3 conidia/mL) (Sequential stress)	10.3	22.6
	S. nodorum (5.4×10^6 conidia/mL) + *B. sorokiniana* (4×10^3 conidia/mL) (Sequential stress)	10.5	21.1

	B. sorokiniana (4×10^3 conidia/mL)	13.3	--
	B. maydis (2×10^4 conidia/mL) + *E. graminis* (8 conidia/mm^2) (Sequential stress)	8.3	23.1
	S. nodorum (5.4×10^6 conidia/mL) + *E. graminis* (8 conidia/mm^2) (Sequential stress)	10.5	2.8
	E. graminis (8 conidia/mm^2)	10.8	--
	B. maydis (2×10^4 conidia/mL) + *R. secalis* (10^4 conidia/mL) (Sequential stress)	4.3	69.3
	S. nodorum (2×10^6 conidia/mL) + *R. secalis* (10^4 conidia/mL) (Sequential stress)	3.8	72.9
	R. secalis (10^4 conidia/mL)	14	--
Lenka	*B. maydis* (2×10^4 conidia/mL) + *B. sorokiniana* (4×10^3 conidia/mL) (Sequential stress)	9.3	47.8
	S. nodorum (5.4×10^6 conidia/mL) + *B. sorokiniana* (4×10^3 conidia/mL) (Sequential stress)	10.5	41
	B. sorokiniana (4×10^3 conidia/mL)	17.8	--
	B. maydis (2×10^4 conidia/mL) + *E. graminis* (8 conidia/mm^2) (Sequential stress)	8.5	29.2
	S. nodorum (5.4×10^6 conidia/mL) + *E. graminis* (8 conidia/mm^2) (Sequential stress)	10.8	10
	E. graminis (8 conidia/mm^2)	12	--
	B. maydis (2×10^4 conidia/mL) + *R. secalis* (10^4 conidia/mL) (Sequential stress)	8.5	48.5
	S. nodorum (2×10^6 conidia/mL) + *R. secalis* (10^4 conidia/mL) (Sequential stress)	10	39.4
	R. secalis (10^4 conidia/mL)	16.5	--

(*Disease scoring scale: 0=0%, 1= 0 to 5%, 2= 5 to 10%, 3=10 to 15%....20=95 to 100% necrotic symptoms on leaf*)

For raw data – Click here (.xlsx file)

Reference– Jorgensen LHJ, Andresen H, Peterson SV (1996) Control of *Drechslera teres* and other barley pathogens by pre inoculation with *Bipolaris maydis* and *Septoria nodorum*. Phytopath. **86:**602-607

Note: *Values are presented as it is from the source article without subjecting to the calculation.*

'*'- *For more information on parameters classification, please refer to 'methodology' tab*

Inference from the study: Jorgensen *et al.*, 1986 studied the effect of pre-inoculation of two non-barley pathogens *B. maydis* from maize and *S. nodorum* from wheat (inducers) over the barley pathogen *D. teres*, *B. sorokiniana*, *E. graminis* and *R. secalis* (challengers) on barley cultivars Canor Carlsberg, Lenka, Ermo and Frost. **Overall, the pre inoculation of non-barley pathogen reduced the disease level of barley pathogens *D. teres, R. secalis, B. sorokiniana***

and *E. graminis* associated with reduced lesion size and percentage reduction of disease score. Hence, the host resistance is getting activated by pre inoculating the non-barley pathogens *B. maydis* and *S. nodorum,* which is involved in the suppression of barley pathogen *D. teres, R. secalis, B. sorokiniana,* and *E. graminis.*