
Host-pathogen interaction between
Phytophthora infestans
and *Solanum tuberosum*
under different photoperiods

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Resistance to *P. infestans*

Plant

Isolate

Resistance HR

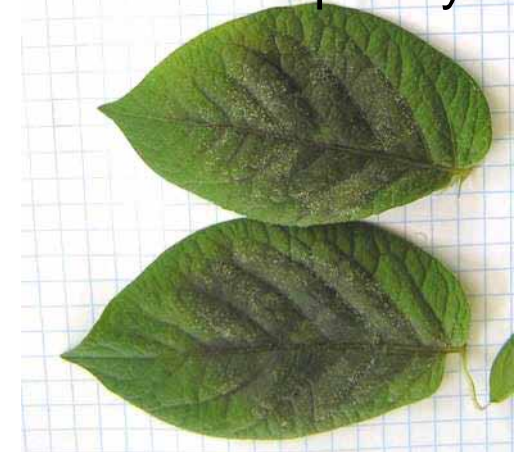
- with R-gene(s)

- Incompatible race – Avr gene



Susceptibility

- Compatible race – avr gene



- without R-gene(s)

- Each isolate

The experiment scheme

Resistance	Material	Trait
Quantitative	(R1, R3, R4, R7, R11, cv. Craigs Royal) X three <i>P. infestans</i> isolates	LGR
		LP
		Sporulation
Qualitative	(R2, R5, R6, R8, R9, R10) X 18 <i>P. infestans</i> isolates	Symptoms

LD conditions 16h



SD conditions 8h



Quantitative resistance

Plant material

<i>R1</i>
<i>R3</i>
<i>R4</i>
<i>R7</i>
<i>R11</i>
cv. Craigs Royal

X

P. Infestans

MP832
MP585
MP674

Analysis of variance for LGR

Factor	df	MS	Probability
Growing Conditions	1	202,35***	0,000
Isolate	2	1,95	0,139
Genotype	5	4,18**	0,002
GC x I	2	2,95	0,054
GC x G	5	2,70*	0,028
I x G	10	0,67	0,702
GC x I x G	10	0,50	0,856
Error	36	0,94	

Cv. Craigs Royal, *R1*, *R3*, *R4*, *R7*, *R11*, showed symptoms of infection by three *P. infestans* isolates in all 5 tests and both growing conditions

R1

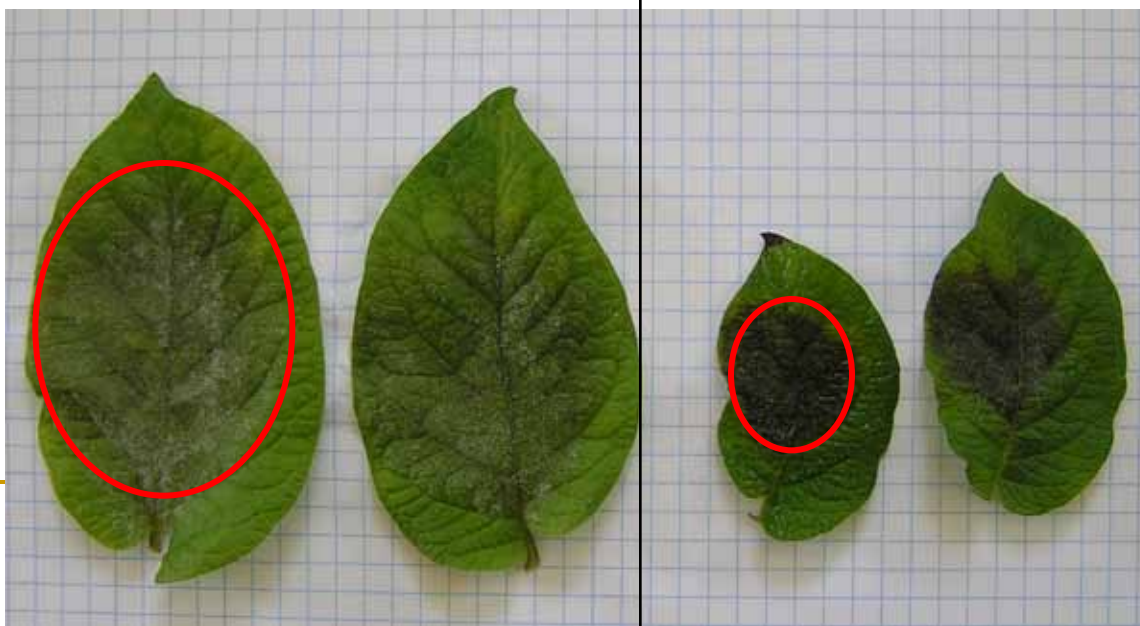
SD

LD

MP 585



MP 674



Analysis of variance for LP

- n Growing conditions – not significant
- n Isolate – significant (but small)
 - MP 674 – 2,1 a
 - MP 585 – 2,2 b
 - MP 750 – 2,2 b
- n Genotype – significant (but small)
(range 2,0 – 2,3)
- n Mean 2,2



First symptoms
of infection

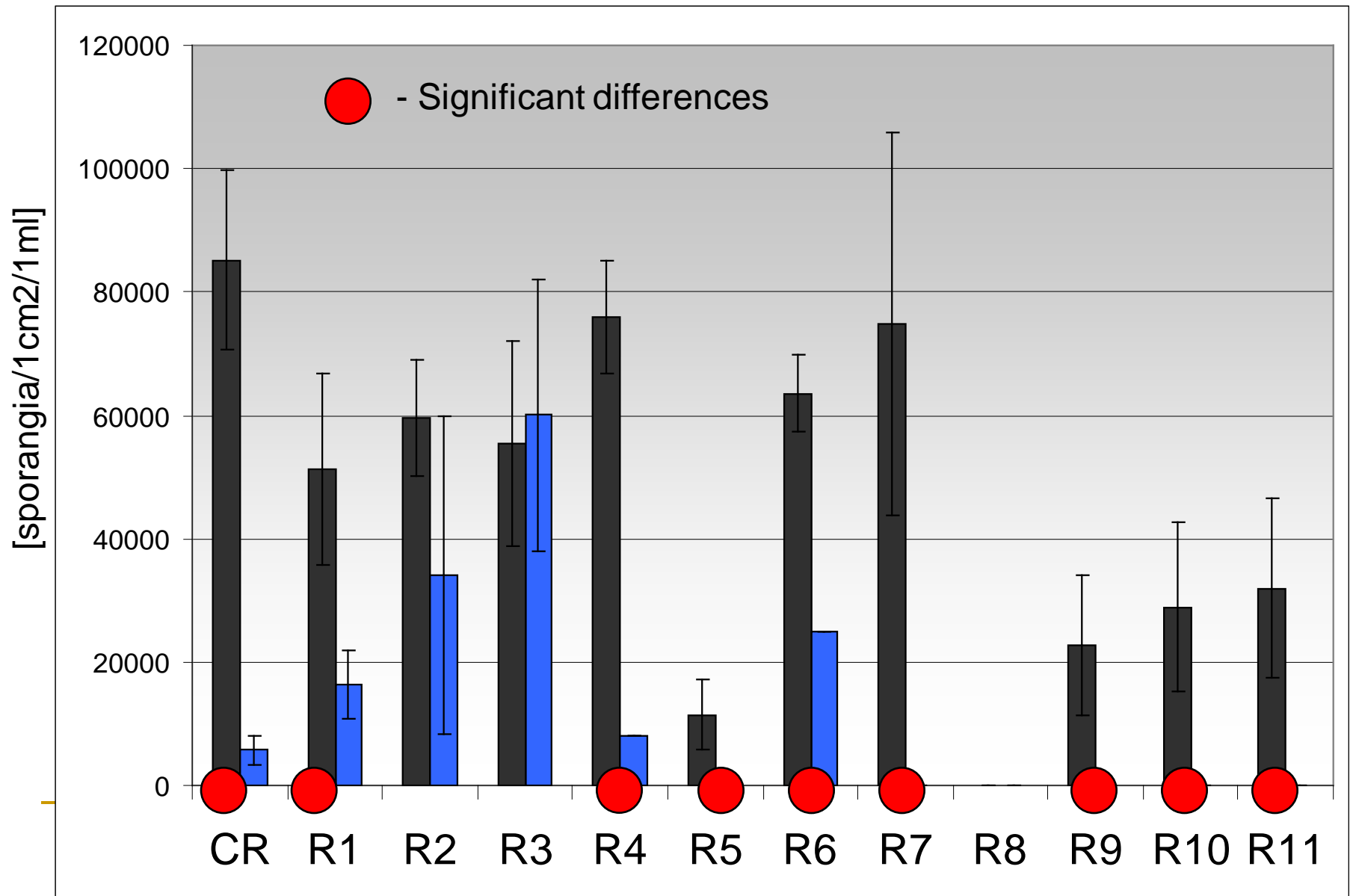
Sporulation of the isolate MP 585

(7 weeks of acclimation)



2 leaflets in 20 ml of water, sporangia counted three
– six replications [sporangia/cm²/ml]

Sporulation of the isolate MP 585



Qualitative resistance

Plant material

<i>R2</i>
<i>R5</i>
<i>R6</i>
<i>R8</i>
<i>R9</i>
<i>R10*</i>

X

P. Infestans

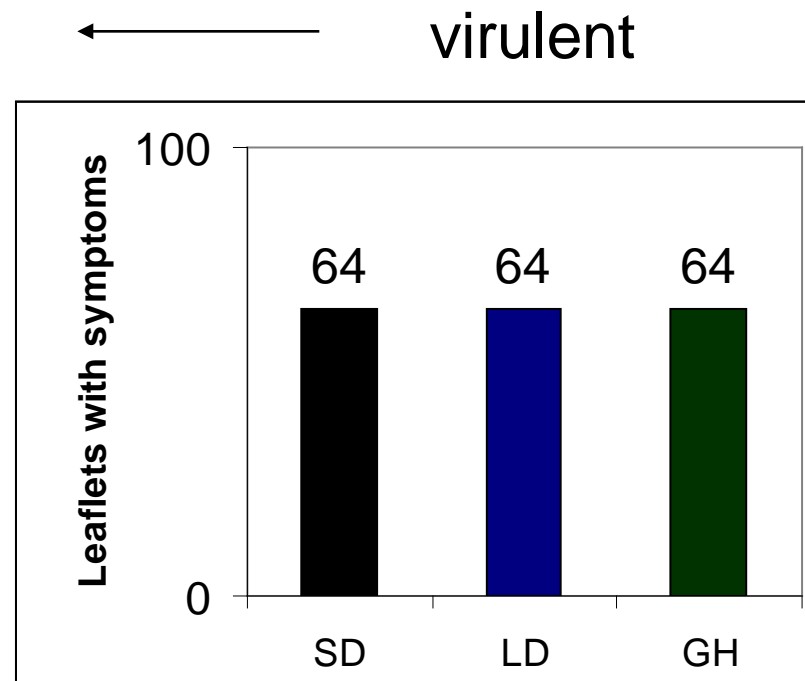
MP832	MP880
MP585	MP834
MP674	MP840
MP750	MP866
MP833	MP868
MP842	MP870
MP846	MP872
MP847	MP873
MP851	MP879

* - *R10* = QTL

(Bradshaw et al., TAG, 2006)

R2

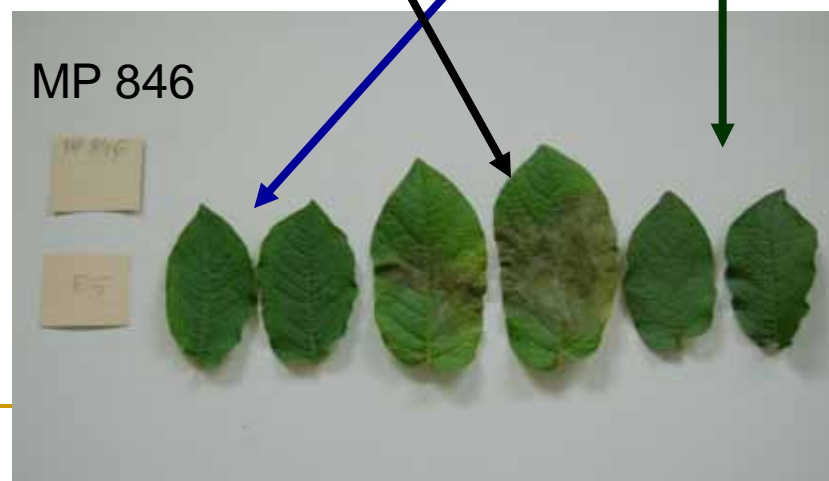
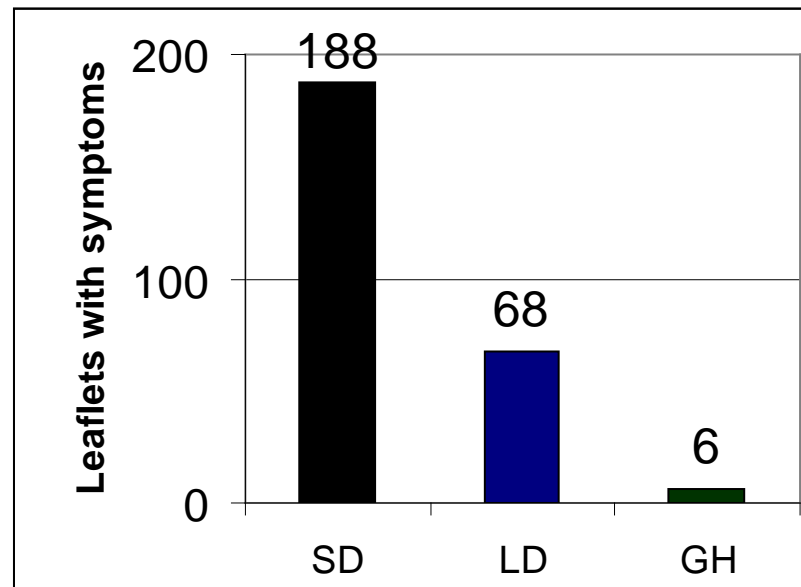
	#	SD	LD	GH
MP832	24	24	24	24
MP585	20	20	20	20
MP674	20	20	20	20
MP750	20	0	0	0
MP833	24	0	0	0
MP842	24	0	0	0
MP846	24	0	0	0
MP847	24	0	0	0
MP851	24	0	0	0
MP880	24	0	0	0
MP834	24	0	0	0
MP840	24	0	0	0
MP866	24	0	0	0
MP868	24	0	0	0
MP870	24	0	0	0
MP872	24	0	0	0
MP873	24	0	0	0
MP879	24	0	0	0



← avirulent

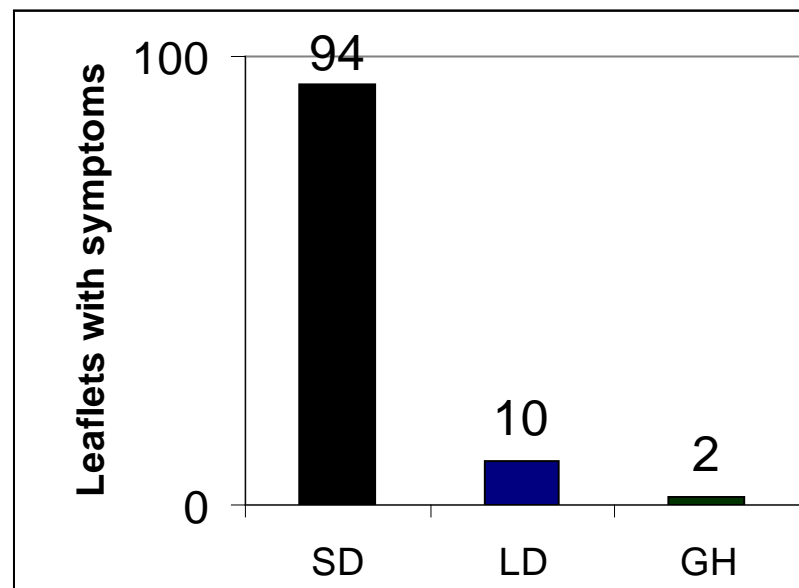
R5

	#	SD	LD	GH
MP832	24	24	20	0
MP846	24	22	4	2
MP847	24	22	1	0
MP834	24	19	8	3
MP840	24	19	3	0
MP880	24	17	7	1
MP674	20	16	6	0
MP585	20	15	7	0
MP842	24	15	4	0
MP833	24	14	0	0
MP851	24	4	0	0
MP750	20	1	8	0
MP866	24	0	0	0
MP868	24	0	0	0
MP870	24	0	0	0
MP872	24	0	0	0
MP873	24	0	0	0
MP879	24	0	0	0



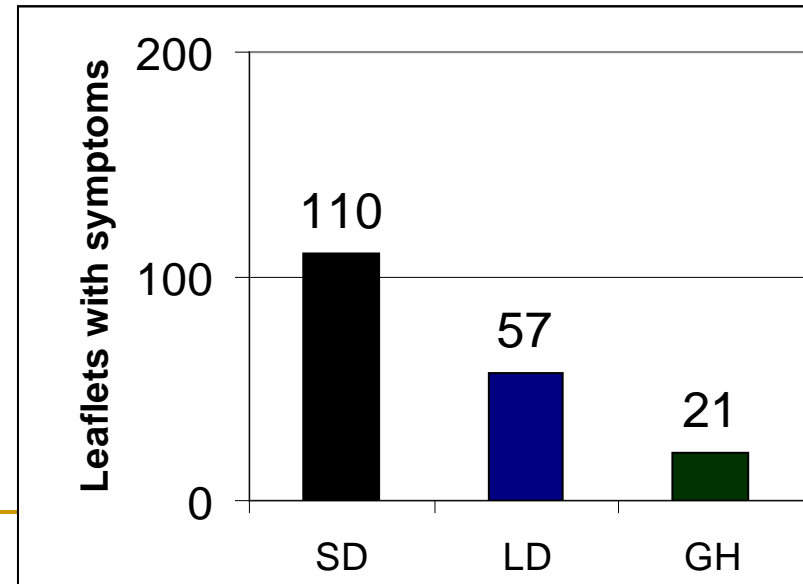
R6

	#	SD	LD	GH
MP832	24	24	24	23
MP585	20	20	20	20
MP674	20	20	20	20
MP847	24	16	1	0
MP833	24	15	0	0
MP840	24	13	0	0
MP842	24	13	2	0
MP880	24	11	2	0
MP750	20	10	1	0
MP851	24	10	3	0
MP834	24	4	1	2
MP846	24	2	0	0
MP866	24	0	0	0
MP868	24	0	0	0
MP870	24	0	0	0
MP872	24	0	0	0
MP873	24	0	0	0
MP879	24	0	0	0

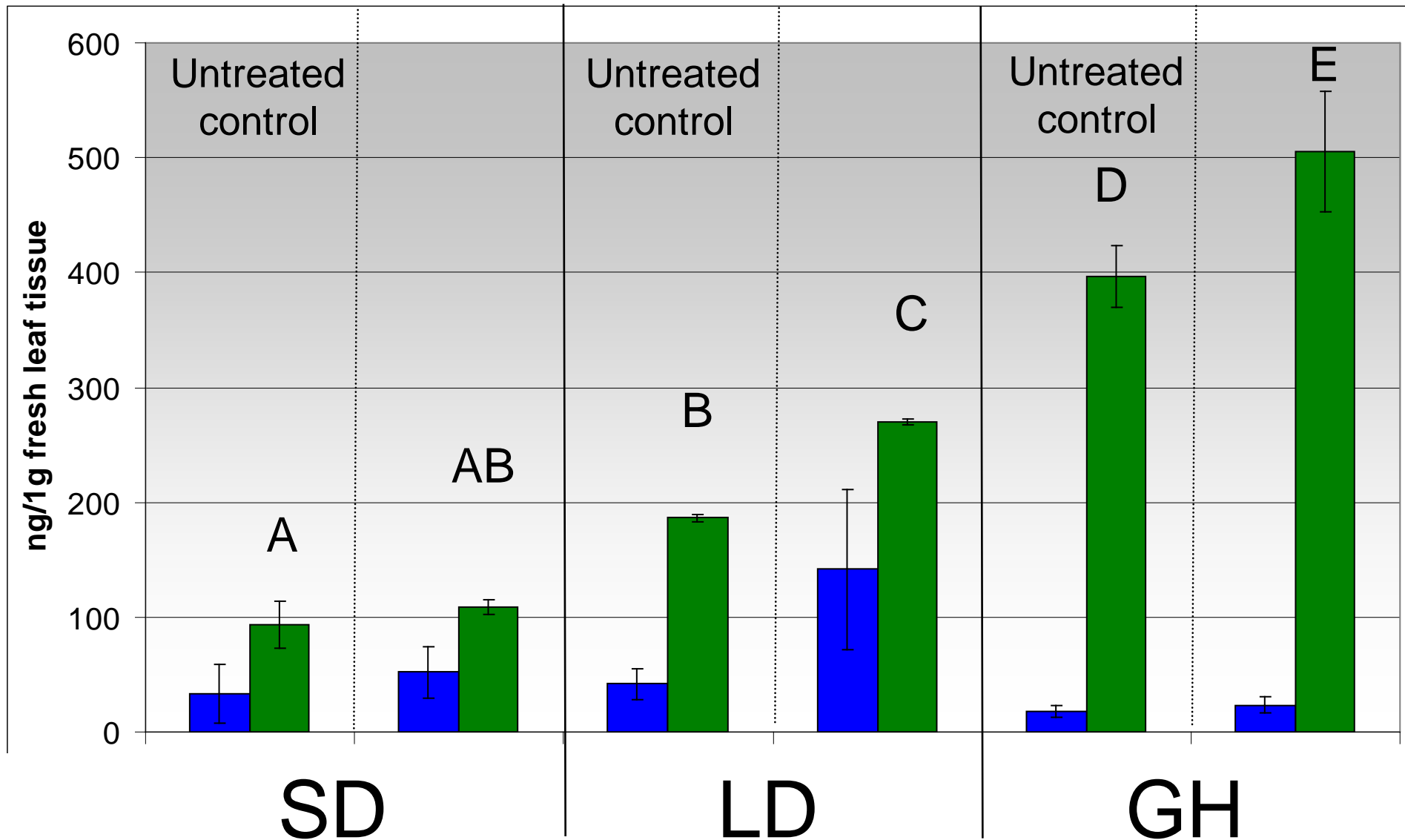


R8

	#	SD	LD	GH
MP851	24	24	10	23
MP880	24	24	21	19
MP750	20	20	13	20
MP872	24	21	17	17
MP847	24	24	22	16
MP879	24	12	12	15
MP846	24	22	13	13
MP833	24	24	17	12
MP840	24	21	20	12
MP842	24	24	24	7
MP832	24	23	8	4
MP873	24	18	5	4
MP870	24	15	5	0
MP834	24	9	6	4
MP866	24	6	4	2
MP868	24	6	3	0
MP674	20	5	0	0
MP585	20	4	2	0



Salicylic Acid (in blue) and Salicylic Acid Glucoside (in green)



(Lebecka and Witek, unpublished data)

(R5 x MP840)

The experiment scheme - SUMMARY

Resistance	Trait	SD vs. LD
Quantitative	LGR	Stronger in SD
	LP	No difference
	Sporulation	Stronger in SD
Qualitative	Symptoms in compatible interaction	No difference
	Symptoms in incompatible interaction	<ul style="list-style-type: none"> n No difference for R2, n Either no difference or break of resistance for R5, R6, R8 in SD

SUMMARY

- n Lower level of Salicylic Acid Glucoside in leaflets of *R5* growing in SD conditions than in leaflets from LD or GH conditions, after inoculation with avirulent isolate MP840,
 - n No difference in SAG level between inoculated and untreated control in SD conditions,
 - n Significant differences in SAG level in inoculated and untreated control in LD and GH conditions.
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Thank you

