Pear scab disease suppression by *Pseudomonas capeferrum* NFX1 is mediated by direct antagonism against *Venturia pyrina* and pear defense priming

Supplementary Data

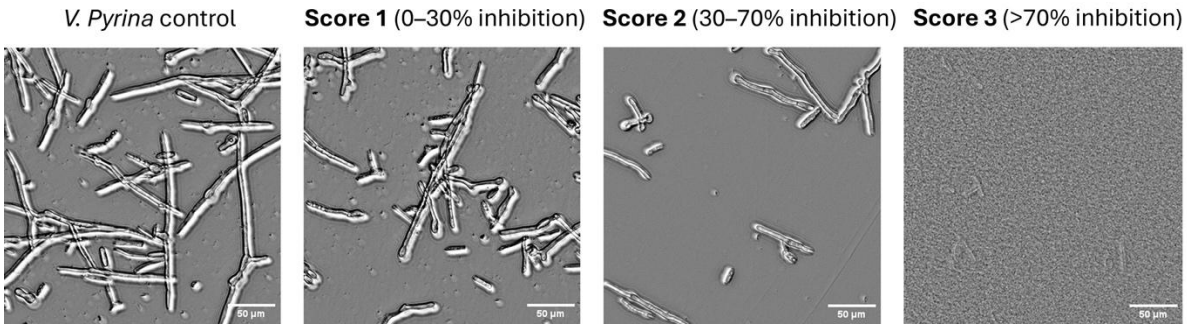


Figure S1- Representative images illustrating the categorical and ordinal three-level rating scale used to evaluate the inhibitory effect of treatments on *Venturia pyrina* spore germination. Images are grouped by inhibition scores: score 1 (0–30% inhibition), score 2 (30–70% inhibition), and score 3 (>70% inhibition), as assessed relative to the not treated *V. pyrina* control (left). Examples are shown for spores incubated in PDBYE (1:10 v/v in sterile distilled water) medium at 36 h post-inoculation (hpi). Scale = 50 µm.

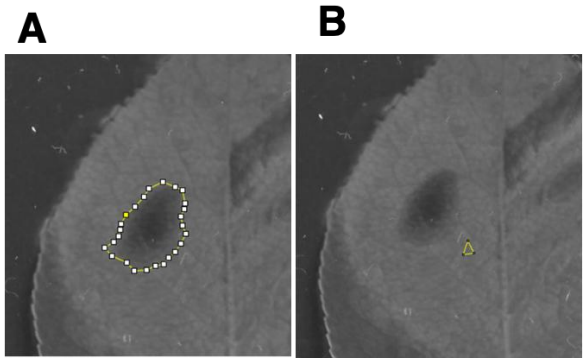


Figure S2- *Venturia pyrina* lesion severity in a detached pear leaf. (**A**) Lesion area outlined by a yellow dashed line for mean pixel intensity measurement. (**B**) Adjacent healthy tissue similarly outlined and used as a normalization reference.

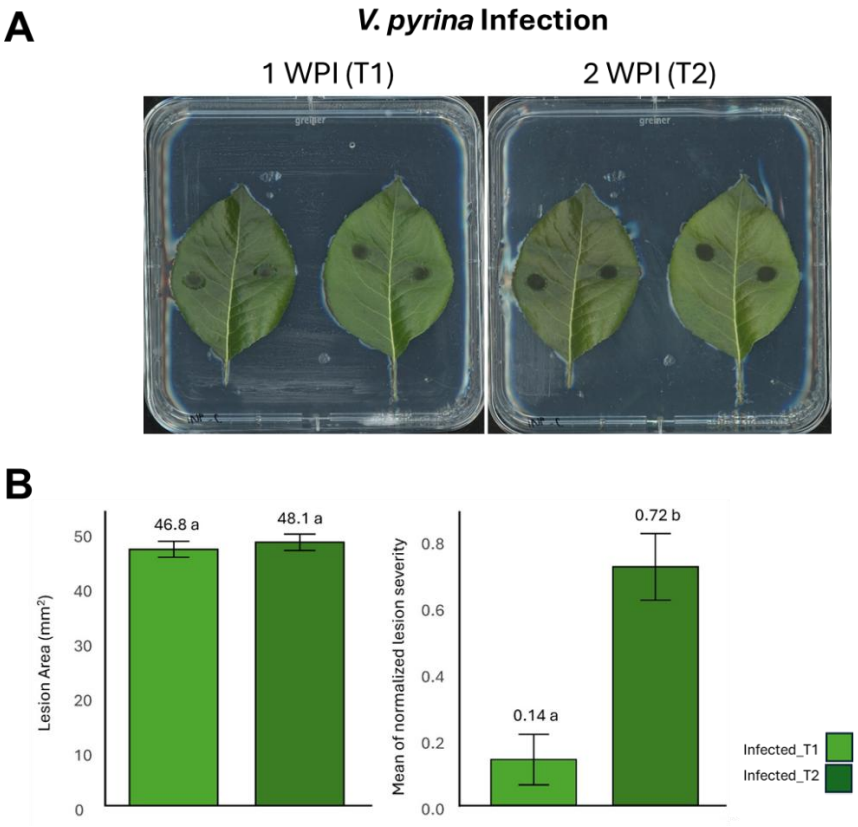


Figure S3- Evaluation of pear scab lesion severity progression in not treated pear leaves. (**A**) Representative images of infected leaves at 1- and 2-weeks post-infection (WPI). (**B**) Average lesion area (mm², left) and normalized lesion severity (positive and min–max rescaled values) ± SE at 1 and 2-WPI. Higher pixel intensity values correspond to darker (more severe) lesions. Different letters indicate significant differences at $p < 0.01$ by Welch Two Sample t-test.

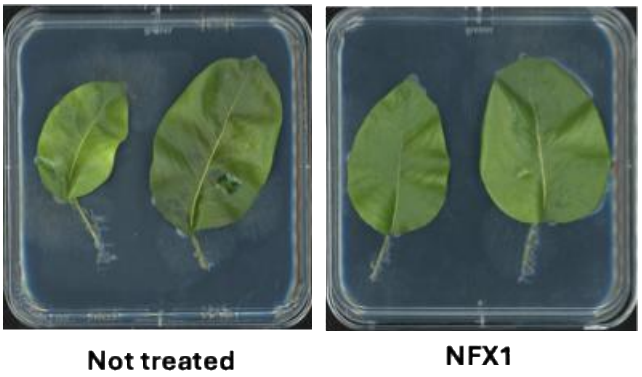


Figure S4- Representative images of not-infected pear leaves from the detached leaf assay 1-week post-infection. Left- Not treated; Right- NFX1-treated

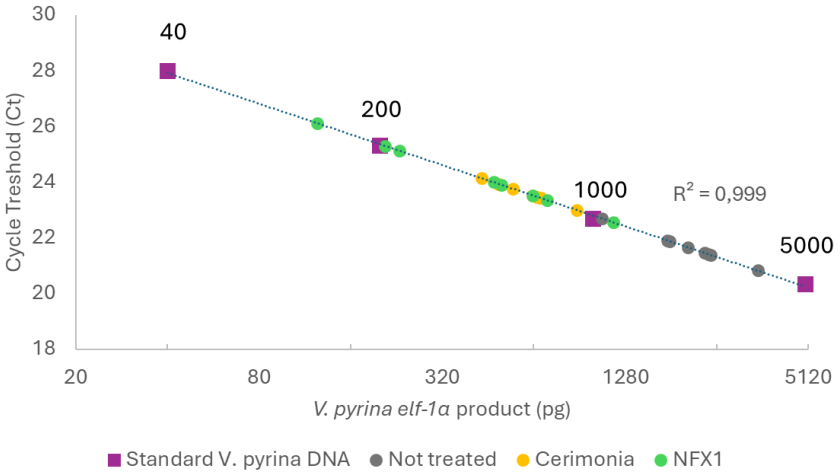


Figure S5- Quantitative PCR (qPCR) assay for detection and quantification of *Venturia pyrina* in pear leaf tissue. Standard curve generated from serial dilutions of purified *V. pyrina* genomic DNA (40 pg, 200 pg, 1000 pg, and 5000 pg), targeting the *ef1-α* gene. Cycle threshold (Ct) values from samples treated with strain NFX1, Cerimonia®, and the not-treated control are plotted for reference. The curve exhibited high linearity (R^2 = 0.999) and an amplification efficiency of 87.7%.

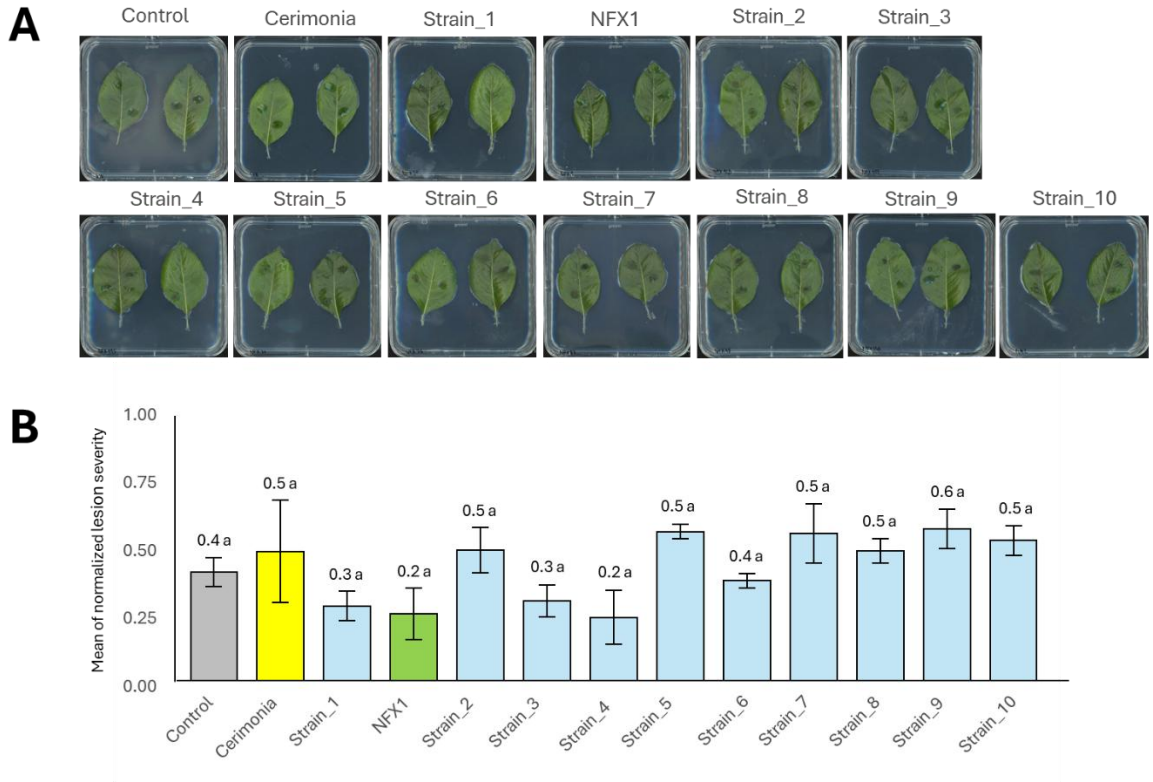


Figure S6- Preliminary screening of 11 bacterial isolates for pear scab biocontrol activity using detached leaf assays. (**A**) Representative images of detached pear leaves inoculated with *V. pyrina* and treated with 11 bacterial isolates, including NFX1 strain, together with not treated and Cerimonia® controls, at 1-week post-infection (WPI). (**B**) Mean of normalized lesion severity (positive and min–max rescaled values) ± SE at 1 WPI. Higher pixel intensity values correspond to darker (more severe) lesions. Same letters indicate no significant differences according to one-way ANOVA followed by Tukey's *post hoc* test ($p < 0.05$).

Table S1 - Primer candidates designed for detection of *Venturia pyrina* by quantitative PCR (qPCR), including the primer sequences, predicted amplicon sizes, melting temperature (Tm), GC content, and secondary structure parameters (the worse ΔG values for hairpins, self-dimers, and heterodimers). The final column indicates the number and size range of potential off targets in the *Pyrus communis* genome. The *ef-1α* primer pair (top row) was selected for this study.

Target Gene (NCBI Accession)	Primer	Sequence (5′–3′)	Product Size (bp)	Tm (°C)	GC%	Hairpin ΔG	Dimer ΔG	Heterodimer ΔG	Targets in *P. communis*
ef-1α (MK888820.1)	FW	CTTCCCCGCTATTTACGCAC	169	62.8	55	-0.27	-3.61	-11.01	No targets
	RW	TCCAGAACCCATGCGTACTT		63.5	50	1.08	-5.38		
β-tubulin (PP534827.1)	FW	TCGGACAGGAATAGCAGTGG	167	63.3	55	0.56	-3.61	-6.68	1 target >3 kb
	RW	AACGAACTTGTTGCCGGAC		63.1	52.6	-0.79	-9.75		
rpb2 (MK887881.1)	FW	CGCCAGGATATCTCTCGGAA	231	62.8	55	-0.13	-7.06	-4.67	5 targets >1 kb
	RW	CAACGTCTGCCTTCTCTTCG		62.6	55	-0.10	-6.30		
	FW	CAGACGTTGGCTTCAGATCG	176	62.6	55	-0.20	-6.30	-6.21	6 targets >2 kb
	RW	AGGCGCCTTGATACGAGAAT		63.5	50	-0.97	-19.23		
ITS region (PP524970.1)	FW	GTTCGAGCGCCATTTCTACC	190	63	55	1.11	-9.89	-5.19	10 targets >1.5 kb
	RW	GTATCCCCACCTGATCCGAG		63	60	0.26	-4.62		
gapdh (KY013074.1)	FW	CACACACGGACTGTTCAAGG	227	62.8	55	-0.43	-3.61	-3.9	5 targets >1 kb
	RW	TTGGCTTTCTCGGTAGTGGT		63.4	50	0.35	-3.61		