

# Root-Associated Entomopathogenic Fungi Modulate their Host Plant's Photosystem II Photchemistry and Response to Herbivorous Insects

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**Table S1.** Comparison of the Untreated and Treated Controls, showing P values for pairwise comparisons with post hoc tests and Dunn-Šidák correction.

Symbol	Parameter	Untreated vs Treated Control	
		Before	After
$\Phi_{PSII}$	Effective quantum yield of PSII photochemistry	0.697	1
$\Phi_{NPQ}$	Quantum yield of regulated non photochemical energy loss in PSII	1	1
$\Phi_{NO}$	Quantum yield of non-regulated loss in PSII	0.001	1
NPQ	Non-photochemical quenching reflecting the dissipation of excitation energy as heat	0.582	0.999
qP	Electron transport rate	0.029	0.225
ETR	Photochemical quenching, representing the fraction of open PSII reaction centers	0.703	1
EXS	Excess excitation energy	0.33	0.797

**Table S2.** Percentage pairwise differences between the experimental treatments for  $\Phi_{NPQ}$  (upper right yellow quadrant) and  $\Phi_{PSII}$  (lower left blue quadrant). Green and red colors indicate increases and decreases, respectively, bold numbers indicate significant differences at  $p < 0.05$ . Untreated and Treated Controls were combined; see Table S1.

$\Phi_{NPQ}$ / $\Phi_{PSII}$		Before			After		
		Control	<i>M. brunneum</i>	<i>B. bassiana</i>	Control	<i>M. brunneum</i>	<i>B. bassiana</i>
Before	Control		12	9	18		
	<i>M. brunneum</i>	15		2		22	
	<i>B. bassiana</i>	8	8				19
After	Control	20				5	7
	<i>M. brunneum</i>		32		7		3
	<i>B. bassiana</i>			24	5	2	

**Table S3.** Percentage pairwise differences between the experimental treatments for  $q_P$  (upper right yellow quadrant) and  $\Phi_{NO}$  (lower left blue quadrant). Green and red colors indicate increases and decreases, respectively, bold numbers indicate significant differences at  $p < 0.05$ . Untreated and Treated Controls were combined for  $q_P$ , see Table S1.

$q_P$ $\Phi_{NO}$		Before				After		
		Untreated Control	Treated Control	<i>M. brunneum</i>	<i>B. bassiana</i>	Controls	<i>M. brunneum</i>	<i>B. bassiana</i>
Before	Untreated Control		15	22	18	6.5		
	Treated Control	9		9	4	25		
	<i>M. brunneum</i>	8	1		5		27	
	<i>B. bassiana</i>	3	6	5				22
After	Controls	8.6	0.16				7	7
	<i>M. brunneum</i>			5		4		0.27
	<i>B. bassiana</i>				3.7	2	6	

**Table S4.** Percentage pairwise differences between the experimental treatments for ETR (upper right yellow quadrant) and NPQ (lower left blue quadrant). Green and red colors indicate increases and decreases, respectively, bold numbers indicate significant differences at  $p < 0.05$ . Untreated and Treated Controls were combined, see Table S1.

ETR NPQ		Before			After		
		Control	<i>M. brunneum</i>	<i>B. bassiana</i>	Control	<i>M. brunneum</i>	<i>B. bassiana</i>
Before	Control		15	8	21		
	<i>M. brunneum</i>	9		8		32	
	<i>B. bassiana</i>	11	2				30
After	Control	22				6	5
	<i>M. brunneum</i>		28		0		2
	<i>B. bassiana</i>			23	9	9	

**Table S5.** Percentage pairwise differences between the experimental treatments for EXC. Green and red colours indicate increases and decreases, respectively, bold numbers indicate significant differences at  $p < 0.05$ . Untreated and Treated Controls were combined, see Table S1.

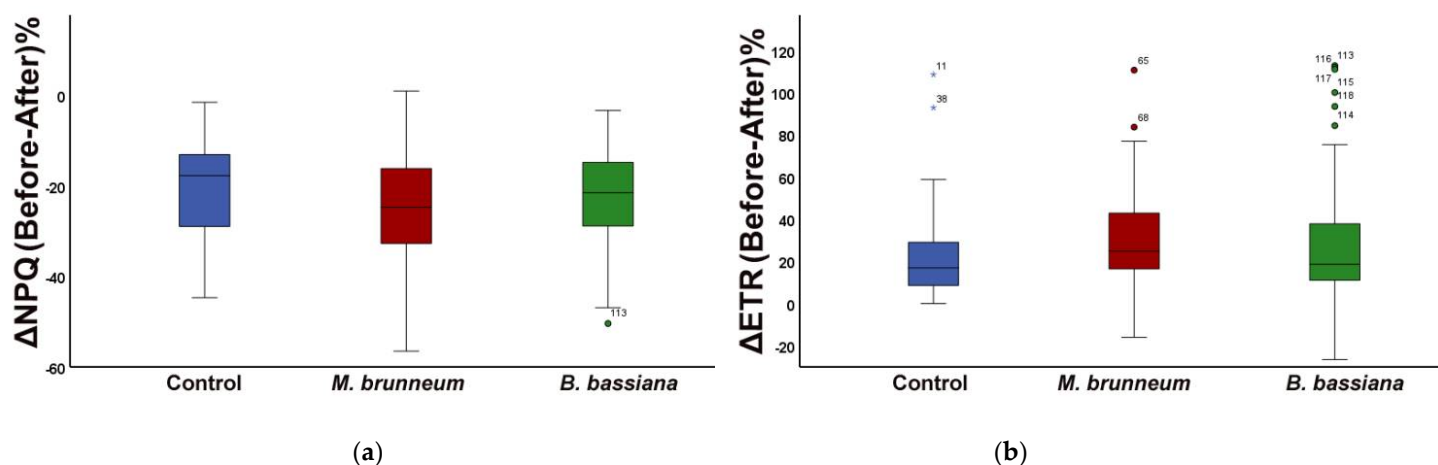
Excess Excitation Energy		Before			After		
		Control	<i>M. brunneum</i>	<i>B. bassiana</i>	Control	<i>M. brunneum</i>	<i>B. bassiana</i>
Before	Control						
	<i>M. brunneum</i>	12					
	<i>B. bassiana</i>	8	4				
After	Control	16					
	<i>M. brunneum</i>		19		7		
	<i>B. bassiana</i>			16	7	0.03	

**Table S6.** Statistical significance of pairwise differences between different leaflet zones (feeding spot, surrounding zone, and rest of leaf) for  $\Phi_{NPQ}$  (upper right yellow quadrant) and  $\Phi_{PSII}$  (lower left blue quadrant). Significance at  $p < 0.001$  is indicated by \*\*\*, otherwise actual  $p$  values are given with significance at  $p < 0.05$  indicated by bold type.

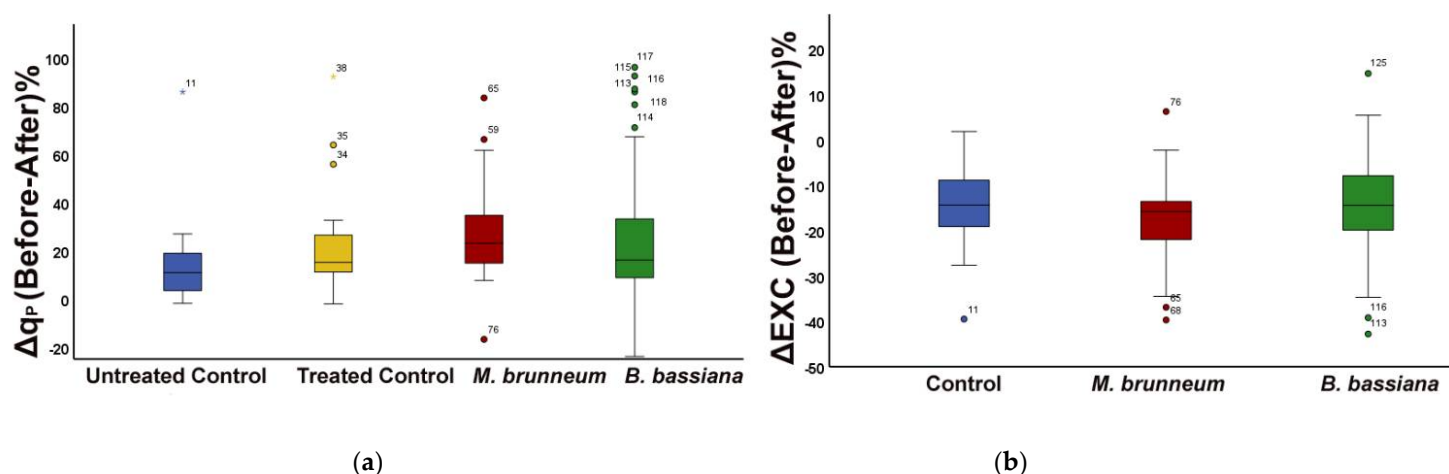
$\Phi_{NPQ}$ $\Phi_{PSII}$		Control			<i>M. brunneum</i>			<i>B. bassiana</i>		
		Feed	Surround	Rest	Feed	Surround	Rest	Feed	Surround	Rest
Control	Feed		***	***	0.17			***		
	Surround	***		0.96		0.65			0.11	
	Rest	***	1				0.18			0.13
<i>M. brunneum</i>	Feed	0.19				***	***	0.03		
	Surround		0.27		***		0.55		0.26	
	Rest			0.04	***	0.97				0.84
<i>B. bassiana</i>	Feed	0.01			0.37				***	***
	Surround		0.23			0.94		***		1
	Rest			0.18			0.42	***	0.99	

**Table S7.** Statistical significance of pairwise differences between different leaflet zones (feeding spot, surrounding zone, and rest of leaf) for  $\Phi_{NO}$ . Significance at  $p < 0.001$  is indicated by \*\*\*, at  $p < 0.01$  by \*\*, otherwise actual  $p$  values are given with significances at  $p < 0.05$  indicated by bold type.

$\Phi_{NO}$		Control			<i>M. brunneum</i>			<i>B. bassiana</i>		
		Feed	Surround	Rest	Feed	Surround	Rest	Feed	Surround	Rest
Control	Feed									
	Surround	***								
	Rest	***	0.81							
<i>M. brunneum</i>	Feed	***								
	Surround		0.30		***					
	Rest			0.23	***	0.68				
<i>B. bassiana</i>	Feed	***			**					
	Surround		0.71			0.26		***		
	Rest			0.85			0.33	***	0.99	



**Figure S1.** Graphs showing percentage changes from Before to After herbivory for **(a)** non-photochemical quenching (NPQ) and **(b)** electron transport rate (ETR), shown for Control plants (blue), *M. brunneum* inoculated plants (red), and *B. bassiana* inoculated plants (green). Boxes and whiskers indicate the 10, 25, 50, 75 and 90 percentiles. Circles and asterisks indicate outliers.



**Figure S2.** Graphs showing percentage changes from Before to After herbivory for **(a)** photochemical quenching ( $q_P$ ) and **(b)** excess excitation energy in PSII (EXC), shown for Untreated and Treated Control plants (blue and yellow), *M. brunneum* inoculated plants (red), and *B. bassiana* inoculated plants (green). Boxes and whiskers indicate the 10, 25, 50, 75 and 90 percentiles. Circles and asterisks indicate outliers.