

Table S1. Effect size (*L*) and corresponding statistics estimated by GLMMs of the control of Fusarium head blight (FHB) incidence, with different fungicides applied based on wheat growth stages (EXP1).

Growth stage ^a	Fungicide treatment ^b	Effect size ^c					
		<i>L</i>	se (<i>L</i>)	95% CI of <i>L</i>		<i>Z</i>	<i>P</i> (<i>Z</i>)
GS55	T1	-0.514	0.171	-0.849	-0.178	-2.997	<0.003
	T2	-0.769	0.185	-1.131	-0.408	-4.167	<0.001
	T5	-0.990	0.269	-1.518	-0.462	-3.676	<0.001
	T6	-0.190	0.221	-0.624	0.243	-0.861	0.389
GS59	T1	-0.981	0.174	-1.322	-0.639	-5.628	<0.001
	T2	-1.190	0.187	-1.558	-0.823	-6.355	<0.001
	T5	-1.155	0.271	-1.686	-0.623	-4.258	<0.001
	T6	-0.483	0.223	-0.920	-0.046	-2.168	0.030
GS61	T1	-0.678	0.172	-1.014	-0.341	-3.945	<0.001
	T2	-1.043	0.185	-1.406	-0.681	-5.641	<0.001
	T5	-0.857	0.269	-1.385	-0.330	-3.187	<0.001
	T6	-0.130	0.222	-0.566	0.306	-0.585	0.558
GS69	T1	-0.704	0.172	-1.042	-0.366	-4.080	<0.001
	T2	-1.150	0.186	-1.515	-0.786	-6.183	<0.001
	T5	-1.014	0.270	-1.543	-0.484	-3.752	<0.001
	T6	-0.363	0.222	-0.799	0.0719	-1.636	0.102

^a Fungicides were applied at four fixed growth stages of wheat: half of heading, half of heads emerged (GS55, Meier, 2001); end of heading (GS59); beginning of flowering, first anthers visible (GS61); end of flowering, all spikelets have completed flowering but some dehydrated anthers may remain (GS69).

^b Fungicide treatments were grouped as T1 (when contain only DMI), T2 when contain DMI and QoI (Quinone outside Inhibitors), T5 when contain DMI and MS (Multi-Site) and T6 when contain DMI and MBC.

^c Model 1.4 in Table 3; *L*, log-transformed response ratio for each treatment relative to the non-treated control; se(*L*), standard error of *L*; 95% CI of *L*, limits of the 95% confidence interval of *L*; *Z*, standard normal statistic from the GLMM, probability value (significant level) of *Z*.

Table S2. Effect size (L) and corresponding statistics estimated by GLMMs of the control of Fusarium head blight (FHB) severity, with different fungicides applied based on wheat growth stages (EXP1).

Growth stage ^a	Fungicide treatment ^b	Effect size ^c					
		L	se (L)	95% CI of L		Z	$P(Z)$
GS55	T1	-0.330	0.089	-0.506	-0.154	-3.684	<0.001
	T2	-0.335	0.093	-0.519	-0.152	-3.59	<0.001
	T5	-0.428	0.144	-0.711	-0.145	-2.967	0.003
	T6	-0.254	0.117	-0.483	-0.026	-2.18	0.030
GS59	T1	-0.448	0.090	-0.624	-0.273	-5.004	<0.001
	T2	-0.473	0.093	-0.656	-0.290	-5.061	<0.001
	T5	-0.426	0.144	-0.709	-0.143	-2.947	0.003
	T6	-0.392	0.117	-0.620	-0.163	-3.359	<0.001
GS61	T1	-0.402	0.089	-0.577	-0.226	-4.484	<0.001
	T2	-0.410	0.093	-0.593	-0.227	-4.395	<0.001
	T5	-0.393	0.144	-0.676	-0.110	-2.72	0.006
	T6	-0.229	0.117	-0.458	0.000	-1.959	0.050
GS69	T1	-0.361	0.089	-0.537	-0.186	-4.033	<0.001
	T2	-0.389	0.093	-0.572	-0.206	-4.163	<0.001
	T5	-0.409	0.144	-0.692	-0.126	-2.829	0.004
	T6	-0.295	0.117	-0.524	-0.066	-2.526	0.011

^a Fungicides were applied at four fixed growth stages of wheat: half of heading, half of heads emerged (GS55, Meier, 2001); end of heading (GS59); beginning of flowering, first anthers visible (GS61); end of flowering, all spikelets have completed flowering but some dehydrated anthers may remain (GS69).

^b Fungicide treatments were grouped as T1 (when contain only DMI), T2 when contain DMI and QoI (Quinone outside Inhibitors), T5 when contain DMI and MS (Multi-Site) and T6 when contain DMI and MBC.

^c Model 1.8 in Table 3; L , log-transformed response ratio for each treatment relative to the non-treated control; se(L), standard error of L ; 95% CI of L , limits of the 95% confidence interval of L ; Z , standard normal statistic from the GLMM, probability value (significant level) of Z .

Table S3. Effect size (L) and corresponding statistics estimated by GLMMs in the reduction of DON, with different fungicides applied based on wheat growth stages (EXP1).

Growth stage ^a	Fungicide treatment ^b	Effect size ^c					
		L	se (L)	95% CI of L		Z	$P(Z)$
GS55	T1	-0.332	0.065	-0.459	-0.205	-5.108	<0.001
	T2	-0.272	0.068	-0.405	-0.138	-3.994	<0.001
	T5	-0.402	0.109	-0.615	-0.189	-3.695	<0.001
	T6	-0.257	0.085	-0.423	-0.091	-3.035	<0.001
GS59	T1	-0.382	0.065	-0.509	-0.254	-5.867	<0.001
	T2	-0.368	0.068	-0.502	-0.234	-5.399	<0.001
	T5	-0.323	0.109	-0.536	-0.110	-2.976	0.003
	T6	-0.402	0.085	-0.569	-0.235	-4.714	<0.001
GS61	T1	-0.394	0.065	-0.522	-0.267	-6.065	<0.001
	T2	-0.321	0.068	-0.454	-0.188	-4.719	<0.001
	T5	-0.361	0.109	-0.573	-0.148	-3.322	0.001
	T6	-0.249	0.085	-0.415	-0.082	-2.932	0.003
GS69	T1	-0.321	0.065	-0.449	-0.194	-4.941	<0.001
	T2	-0.247	0.068	-0.381	-0.114	-3.637	<0.001
	T5	-0.356	0.109	-0.568	-0.143	-3.273	0.001
	T6	-0.296	0.085	-0.462	-0.129	-3.479	0.001

^a Fungicides were applied at four fixed growth stages of wheat: half of heading, half of heads emerged (GS55, Meier, 2001); end of heading (GS59); beginning of flowering, first anthers visible (GS61); end of flowering, all spikelets have completed flowering but some dehydrated anthers may remain (GS69).

^b Fungicide treatments were grouped as T1 (when contain only DMI), T2 when contain DMI and QoI (Quinone outside Inhibitors), T5 when contain DMI and MS (Multi-Site) and T6 when contain DMI and MBC.

^c Model 1.12 in Table 3; L , log-transformed response ratio for each treatment relative to the non-treated control; se(L), standard error of L ; 95% CI of L , limits of the 95% confidence interval of L ; Z , standard normal statistic from the GLMM, probability value (significant level) of Z .

Table S4. Effect size (L) and corresponding statistics estimated by GLMMs of the control of Fusarium head blight (FHB) incidence with different fungicides applied based on days before or after artificial inoculation of spikes with *Fusarium graminearum* (EXP2).

Timing ^a	Fungicide treatment ^b	Effect size ^c					
		L	se (L)	95% CI of L		Z	$P(Z)$
-10DI	T1	-1.364	0.271	-1.895	-0.833	-5.034	<0.001
	T3	-2.554	0.494	-3.522	-1.587	-5.175	<0.001
	T4	-0.081	0.376	-0.818	0.657	-0.214	0.830
-7DI	T1	-2.075	0.273	-2.610	-1.540	-7.603	<0.001
	T3	-3.350	0.495	-4.320	-2.381	-6.772	<0.001
	T4	-0.630	0.393	-1.401	0.140	-1.603	0.109
-4DI	T1	-2.332	0.274	-2.870	-1.794	-8.499	<0.001
	T3	-4.185	0.516	-5.196	-3.174	-8.111	<0.001
	T4	-0.953	0.419	-1.774	-0.132	-2.275	0.023
-1DI	T1	-2.513	0.276	-3.053	-1.973	-9.121	<0.001
	T3	-4.302	0.524	-5.330	-3.275	-8.208	<0.001
	T4	-0.483	0.397	-1.261	0.295	-1.216	0.224
3DI	T1	-1.044	0.271	-1.575	-0.514	-3.857	<0.001
	T3	-1.827	0.499	-2.806	-0.848	-3.659	<0.001
	T4	-0.663	0.406	-1.459	0.134	-1.631	0.103
5DI	T1	-0.871	0.270	-1.400	-0.342	-3.227	0.001
	T3	-0.868	0.544	-1.934	0.199	-1.595	0.111
	T4	-0.564	0.390	-1.328	0.200	-1.447	0.148

^a Fungicides were applied 1, 7, 4 or 10 days before, or 3 or 5 days after the day of inoculation (DI) with a mixture of *F. graminearum* strains.

^b Fungicide treatments were grouped as T1 (when contain only DMI), T3 when contain DMI and SDHI, and T4 when contain MBC.

^c Model 2.4 in Table 3; L , log-transformed response ratio for each treatment relative to the non-treated control; se(L), standard error of L ; 95% CI of L , limits of the 95% confidence interval of L ; Z , standard normal statistic from the GLMM, probability value (significant level) of Z .

Table S5. Effect size (L) and corresponding statistics estimated by GLMMs of the control of Fusarium head blight (FHB) severity with different fungicides applied based on days before or after artificial inoculation of spikes with *Fusarium graminearum* (EXP2).

Timing ^a	Fungicide treatment ^b	Effect size ^c					
		L	se (L)	95% CI of L		Z	$P(Z)$
-10DI	T1	-0.730	0.105	-0.936	-0.524	-6.932	<0.001
	T3	-1.377	0.154	-1.679	-1.075	-8.940	<0.001
	T4	-0.049	0.161	-0.364	0.266	-0.305	0.761
-7DI	T1	-0.691	0.106	-0.900	-0.483	-6.514	<0.001
	T3	-1.414	0.155	-1.718	-1.111	-9.126	<0.001
	T4	0.009	0.161	-0.307	0.326	0.059	0.953
-4DI	T1	-0.911	0.105	-1.117	-0.704	-8.632	<0.001
	T3	-1.739	0.155	-2.043	-1.436	-11.247	<0.001
	T4	-0.216	0.161	-0.531	0.099	-1.345	0.179
-1DI	T1	-0.902	0.106	-1.110	-0.695	-8.529	<0.001
	T3	-1.721	0.155	-2.025	-1.418	-11.115	<0.001
	T4	-0.094	0.161	-0.410	0.221	-0.586	0.558
3DI	T1	-0.660	0.105	-0.867	-0.454	-6.276	<0.001
	T3	-1.102	0.153	-1.402	-0.801	-7.19	<0.001
	T4	-0.192	0.161	-0.508	0.123	-1.196	0.232
5DI	T1	-0.342	0.106	-0.550	-0.135	-3.234	0.001
	T3	-0.519	0.152	-0.817	-0.221	-3.414	0.001
	T4	0.013	0.161	-0.303	0.330	0.082	0.935

^a Fungicides were applied 1, 7, 4 or 10 days before, or 3 or 5 days after the day of inoculation (DI) with a mixture of *F. graminearum* strains.

^b Fungicide treatments were grouped as T1 (when contain only DMI), T3 when contain DMI and SDHI, and T4 when contain MBC.

^c Model 2.8 in Table 3; L , log-transformed response ratio for each treatment relative to the non-treated control; se(L), standard error of L ; 95% CI of L , limits of the 95% confidence interval of L ; Z , standard normal statistic from the GLMM, probability value (significant level) of Z .

Table S6. Effect size (L) and corresponding statistics estimated by GLMMs of the reduction of DON with different fungicides applied based on days before or after artificial inoculation of spikes with *Fusarium graminearum* (EXP2).

Timing	Fungicide treatment ^a	L^b	se (L) ^c	95% CI of L^d		Z^e	$P(Z)^f$
-10DI	T1	-1.376	0.126	-1.623	-1.130	-10.953	<0.001
	T3	-2.286	0.192	-2.662	-1.909	-11.896	<0.001
	T4	0.025	0.197	-0.361	0.411	0.128	0.898
-7DI	T1	-1.133	0.129	-1.386	-0.881	-8.795	<0.001
	T3	-2.196	0.192	-2.573	-1.819	-11.418	<0.001
	T4	0.137	0.197	-0.249	0.523	0.694	0.488
-4DI	T1	-1.597	0.126	-1.843	-1.350	-12.711	<0.001
	T3	-2.756	0.189	-3.127	-2.385	-14.564	<0.001
	T4	-0.409	0.194	-0.789	-0.028	-2.107	0.035
-1DI	T1	-1.539	0.127	-1.788	-1.291	-12.137	<0.001
	T3	-2.675	0.189	-3.046	-2.304	-14.128	<0.001
	T4	-0.084	0.196	-0.468	0.299	-0.430	0.667
3DI	T1	-1.305	0.126	-1.551	-1.059	-10.393	<0.001
	T3	-1.925	0.193	-2.303	-1.547	-9.980	<0.001
	T4	-0.397	0.194	-0.778	-0.016	-2.043	0.041
5DI	T1	-0.598	0.128	-0.850	-0.347	-4.669	<0.001
	T3	-0.829	0.193	-1.207	-0.450	-4.291	<0.001
	T4	0.090	0.197	-0.296	0.476	0.457	0.648

^a Fungicides were applied 1, 7, 4 or 10 days before, or 3 or 5 days after the day of inoculation (DI) with a mixture of *F. graminearum* strains.

^b Fungicide treatments were grouped as T1 (when contain only DMI), T3 when contain DMI and SDHI, and T4 when contain MBC.

^c Model 2.12 in Table 3; L , log-transformed response ratio for each treatment relative to the non-treated control; se(L), standard error of L ; 95% CI of L , limits of the 95% confidence interval of L ; Z , standard normal statistic from the GLMM, probability value (significant level) of Z .