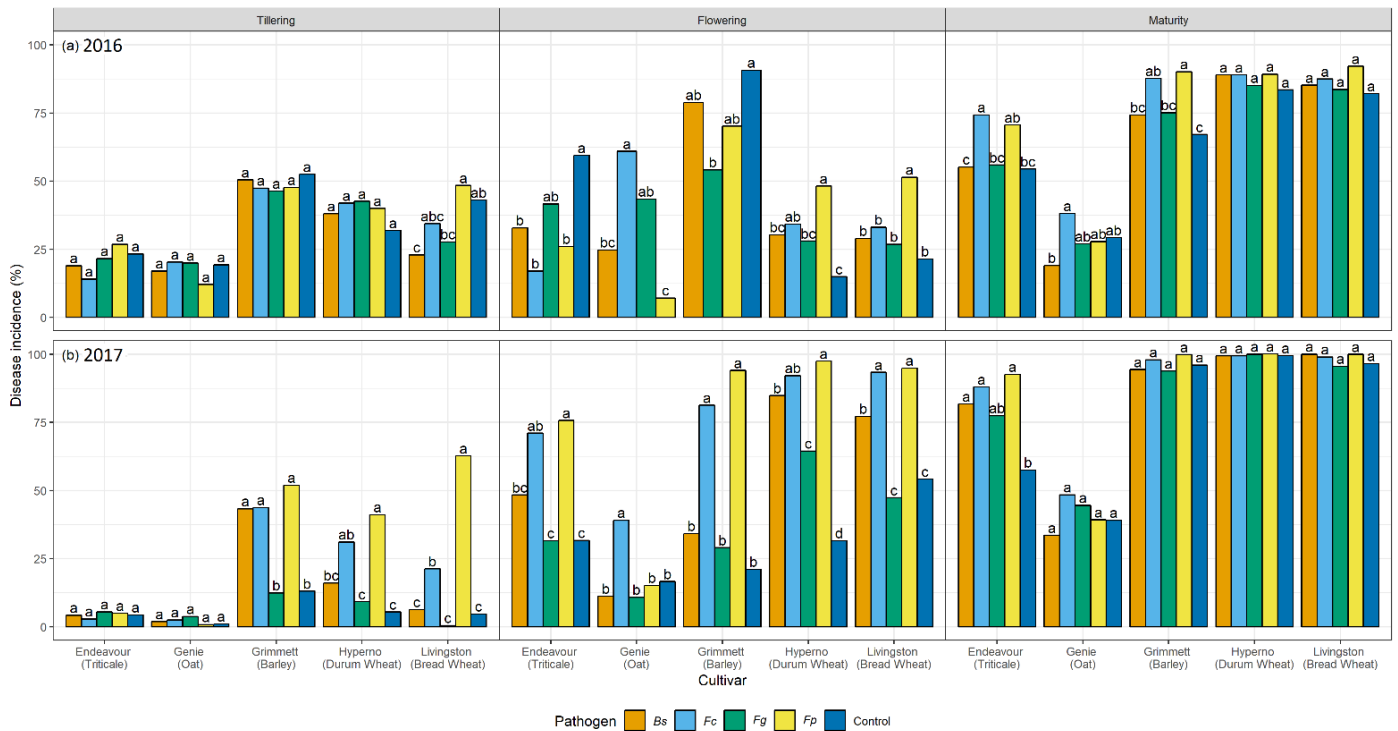
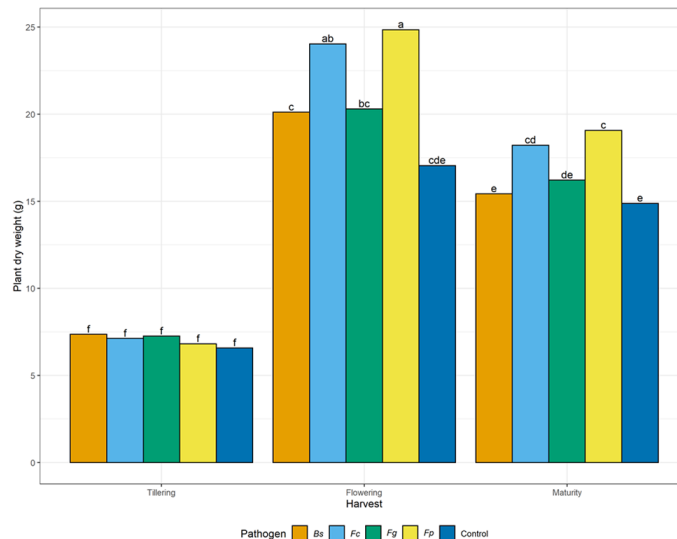


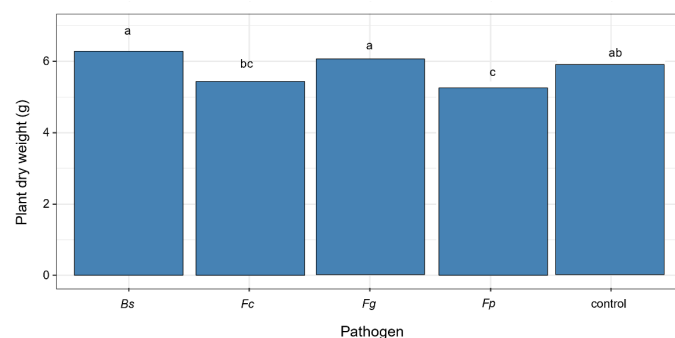
## Supplementary Material



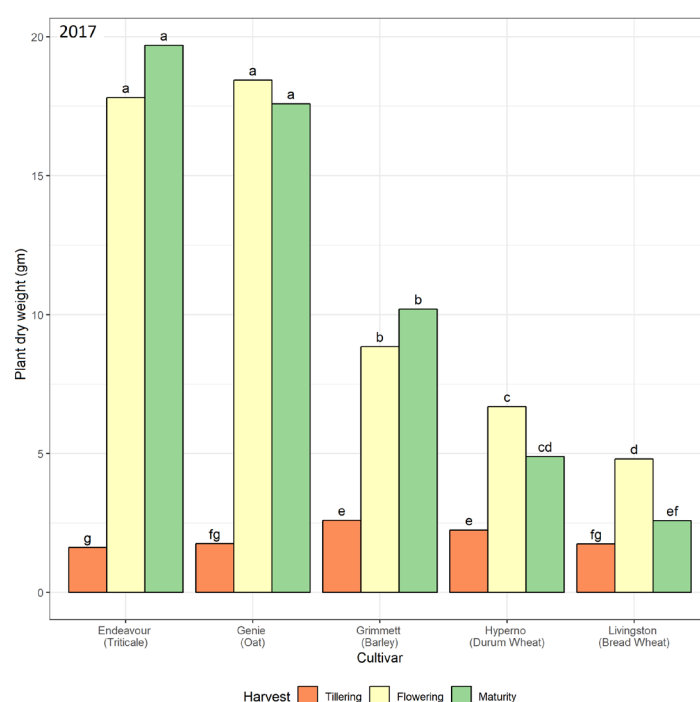
**Figure S1.** Average percentage of incidence of discoloured stems per plant between pathogen within a cultivar and harvest time interaction in 2016 (a) and 2017 (b). Different letters represent significant differences between pathogens within a cultivar and harvest time at  $\alpha < 0.05$ . Treatments include *Fusarium pseudograminearum* strains (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs), and one non-inoculated control for each host.



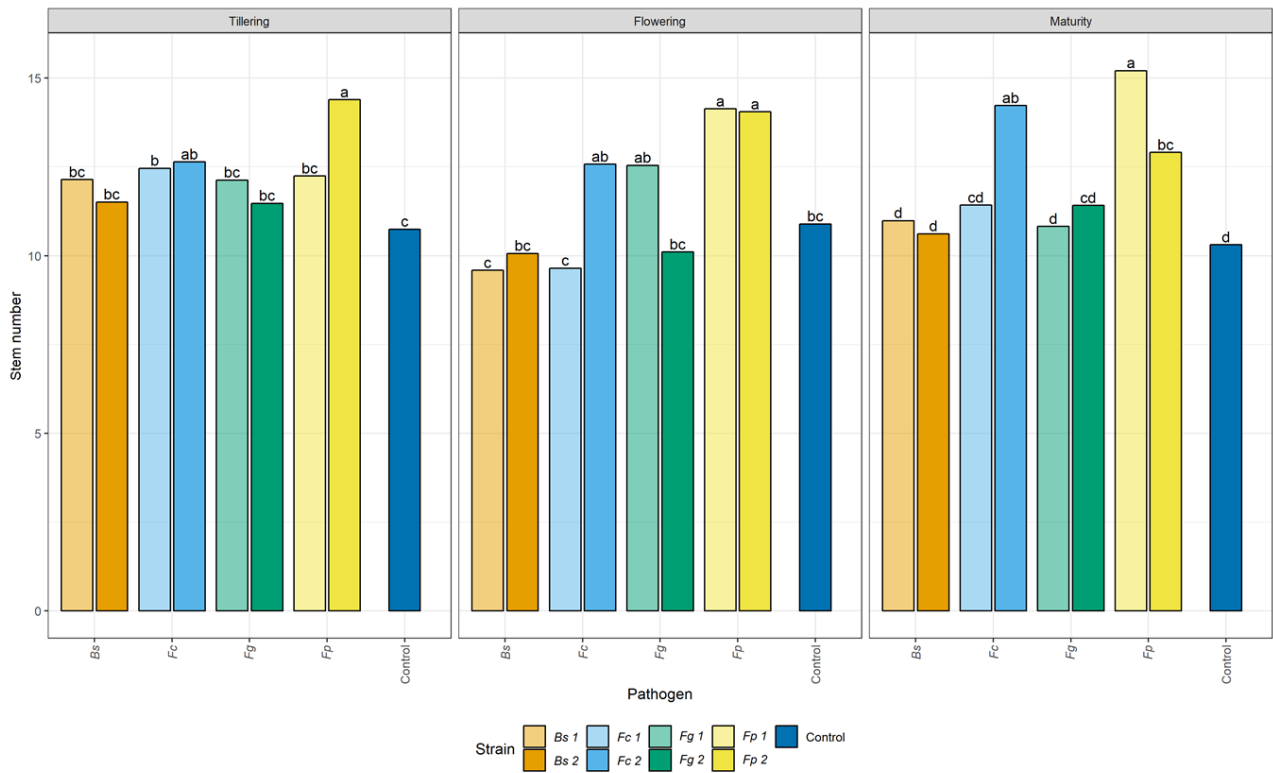
**Figure S2.** Average value of plant dry weight for the pathogen within harvest time interaction in 2016. Treatments include *Fusarium pseudograminearum* (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs) and non-inoculated control for each host. Different letters represent significant differences between pathogens within harvest time at  $\alpha < 0.05$ .



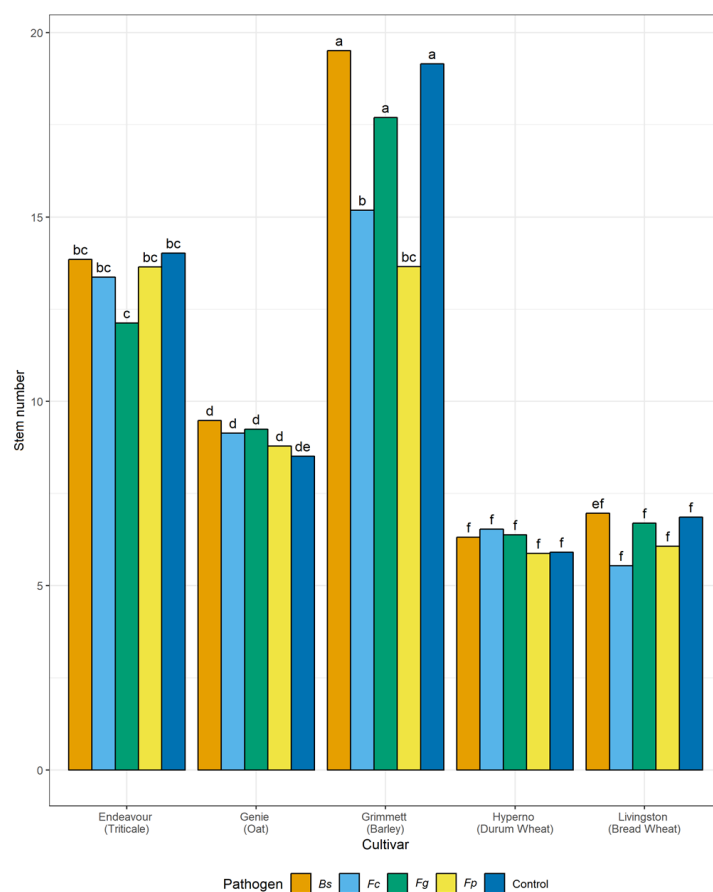
**Figure S3.** Average value of plant dry weight for each pathogen effect for the 2017 field trial. Treatments include *Fusarium pseudograminearum* (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs) and the non-inoculated control. Different letters represent significant differences between pathogens at  $\alpha < 0.05$ .



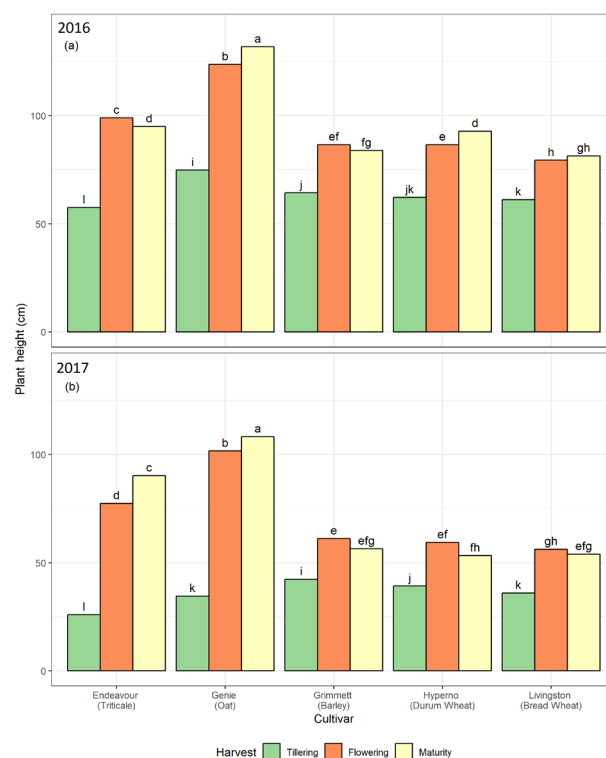
**Figure S4.** Average value of plant dry weight for cultivar at each harvest time for the 2017 field trial. Different letters represent significant differences between cultivars and harvest time at  $\alpha < 0.05$ .



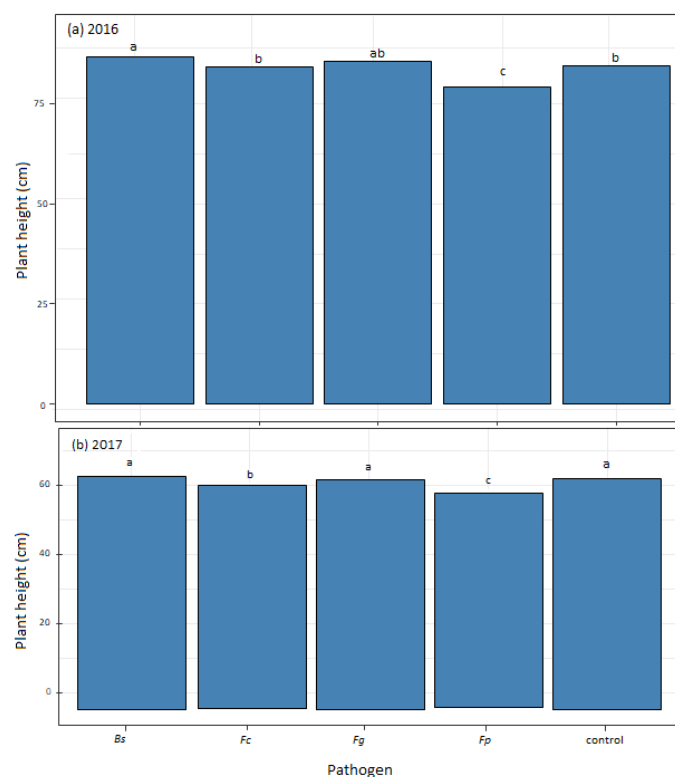
**Figure S5.** Average value of stem number for pathogens and strains at different harvest times for the 2016 field trial. Treatments include *Fusarium pseudograminearum* (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs) and the non-inoculated control. Different letters represent significant differences between pathogens within harvest time at  $\alpha < 0.05$ .



**Figure S6.** Average value of stem number for pathogens by cultivars interaction for the 2017 field trial. Treatments include *Fusarium pseudograminearum* (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs) and the non-inoculated control. Different letters represent significant differences between pathogens and cultivars at  $\alpha < 0.05$ .



**Figure S7.** Average value of plant height for cultivar at each harvest time for the 2016 (a) and 2017 (b) field trials. Different letters represent significant differences between cultivars within harvest time at  $\alpha < 0.05$ .



**Figure S8.** Average value of plant height for each pathogen effect across the cultivars for the 2016 (a) and 2017 (b) field trials. Treatments include *Fusarium pseudograminearum* strains (Fp), *F. culmorum* (Fc), *F. graminearum* (Fg), *Bipolaris sorokiniana* (Bs) and the non-inoculated control. Different letters represent significant differences between pathogens at  $\alpha < 0.05$ .

**Table S1.** Monthly rainfall (mm) for 2016 and 2017 Toowoomba Airport station <http://www.bom.gov.au/climate/data> (accessed on 28 August 2019). Station Number: 041529; State: QLD; Opened: 1996; Latitude: 27.54°S; Longitude: 151.91°E; Elevation: 641 m. (The total amount of the monthly rainfall of the growing season is indicated in bold).

Year	Monthly Rainfall (mm)												Total Annual Rainfall
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>2016</b>	82.2	79.6	70.2	6.4	19.0	109.6	<b>40.4</b>	<b>54.8</b>	<b>104.0</b>	<b>29.0</b>	<b>25.0</b>	<b>33.8</b>	654.0
<b>2017</b>	93.4	21.2	313.6	20.6	14.4	35.8	<b>26.4</b>	<b>2.0</b>	<b>1.0</b>	<b>150.4</b>	<b>26.0</b>	<b>104.0</b>	808.8

**Table S2.** ANOVA table for analysis of discoloured stems per plant (incidence of discoloured stems) of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations were described using  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	<i>f</i> -value	<i>p</i> -value
(Intercept)	1	2.0	247.40	0.004
Harvest	2	224.0	315.00	<0.001
Cultivar	4	221.0	88.22	<0.001
Pathogen	4	220.8	5.16	0.001
Harvest: Cultivar	8	224.4	21.66	<0.001
Pathogen: Strain	4	222.2	2.28	0.061
Harvest: Pathogen	8	223.7	1.11	0.360
Cultivar: Pathogen	16	220.5	2.09	0.010
Harvest: Pathogen: Strain	8	225.6	1.93	0.056
Cultivar: Pathogen: Strain	16	221.5	0.65	0.841
Harvest: Cultivar: Pathogen	30	224.1	1.82	0.008
Harvest: Cultivar: Pathogen: Strain	25	223.5	1.25	0.197

**Table S3.** ANOVA table for analysis of discoloured stems per plant (incidence of discoloured stems) of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations were described using  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	<i>f</i> -value	<i>p</i> -value
(Intercept)	1	2.0	0.14	0.741
Harvest	2	146.1	710.90	<0.001
Cultivar	4	146.3	134.80	<0.001
Pathogen	4	146.1	45.88	<0.001
Harvest: Cultivar	8	146.4	12.39	<0.001
Harvest: Pathogen	8	146.2	7.52	<0.001
Cultivar: Pathogen	16	146.4	3.61	<0.001
Harvest: Cultivar: Pathogen	32	146.5	2.20	0.001

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.

**Table S4.** ANOVA table for analysis of disease severity on the stems ratings of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations were described using  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	1.9	1148.00	0.001
Harvest	1	127.6	139.70	<0.001
Cultivar	4	127.1	40.98	<0.001
Pathogen	4	126.9	46.93	<0.001
Harvest: Cultivar	4	127.1	12.45	<0.001
Pathogen: Strain	4	128.6	3.10	0.018
Harvest: Pathogen	4	127.9	22.13	<0.001
Cultivar: Pathogen	16	127.1	5.06	<0.001
Harvest: Pathogen: Strain	4	130.9	2.21	0.071
Cultivar: Pathogen: Strain	16	128.6	1.63	0.070
Harvest: Cultivar: Pathogen	14	128.5	2.52	0.003
Harvest: Cultivar: Pathogen: Strain	9	126.8	3.04	0.002

**Table S5.** ANOVA table for analysis of disease severity on the stems ratings of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations were described using  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	144.4	7528.00	<0.001
Harvest	2	144.4	173.50	<0.001
Cultivar	4	144.6	53.20	<0.001
Pathogen	4	144.4	60.57	<0.001
Harvest: Cultivar	8	144.7	7.82	<0.001
Harvest: Pathogen	8	144.5	11.45	<0.001
Cultivar: Pathogen	16	144.7	6.91	<0.001
Harvest: Cultivar: Pathogen	32	144.7	2.01	0.003

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.

**Table S6.** ANOVA table for analysis of sub-crown internode rating of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	1.8	5650.00	<0.001
Harvest	2	223.8	121.10	<0.001
Cultivars	4	210.4	26.11	<0.001
Pathogen	4	211.9	69.64	<0.001
Harvest: Cultivars	8	225.1	25.46	<0.001
Pathogen: Strain	4	214.5	3.67	0.006
Harvest: Pathogen	8	226.6	1.85	0.068
Genotype: Pathogen	16	211.1	4.38	<0.001
Harvest: Pathogen: Strain	8	229.2	1.11	0.360
Cultivar: Pathogen: Strain	16	213.3	1.36	0.162
Harvest: Cultivars: Pathogen	30	226.7	1.31	0.136
Harvest: Cultivars: Pathogen: Strain	25	227.4	0.64	0.908

**Table S7.** ANOVA table for analysis of sub-crown internode rating of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	2.0	116.40	0.009
Harvest	2	143.2	179.00	<0.001
Cultivar	4	143.1	36.74	<0.001
Pathogen	4	143.1	37.47	<0.001
Harvest: Cultivar	8	143.7	5.24	<0.001
Harvest: Pathogen	8	143.6	1.19	0.307
Cultivars: Pathogen	16	143.6	3.16	<0.001
Cultivar: Pathogen: Strain	32	144.2	0.87	0.664

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.

**Table S8.** ANOVA table for analysis of plant dry weight of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	214.9	44170.00	<0.001
Harvest	2	223.7	732.70	<0.001
Cultivar	4	214.0	88.65	<0.001
Pathogen	4	214.4	4.37	0.002
Harvest: Cultivar	8	224.7	20.99	<0.001
Pathogen: Strain	4	216.4	1.44	0.223
Harvest: Pathogen	8	223.6	2.65	0.008
Cultivar: Pathogen	16	213.4	0.42	0.976
Harvest: Pathogen: Strain	8	226.6	1.08	0.376
Cultivar: Pathogen: Strain	16	214.6	1.03	0.421
Harvest: Cultivar: Pathogen	30	224.3	0.69	0.884
Harvest: Cultivar: Pathogen: Strain	25	222.3	0.88	0.633

**Table S9.** ANOVA table for analysis of plant dry weight of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	f-value	p-value
(Intercept)	1	2.0	11550.00	<0.001
Harvest	2	143.3	939.00	<0.001
Cultivar	4	143.6	178.60	<0.001
Pathogen	4	143.2	4.78	0.001
Harvest: Cultivar	8	143.8	63.00	<0.001
Harvest: Pathogen	8	143.4	1.13	0.349
Cultivar: Pathogen	16	143.8	0.92	0.549
Harvest: Cultivar: Pathogen	32	144.0	1.01	0.465

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.



**Table S10.** ANOVA table for analysis of stem number of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	F-value	p-value
(Intercept)	1	208.6	32050.00	<0.001
Harvest	2	215.4	0.95	0.390
Cultivar	4	207.9	116.80	<0.001
Pathogen	4	208.2	16.41	<0.001
Harvest: Cultivar	8	216.2	5.19	<0.001
Pathogen: Strain	4	210.2	2.05	0.088
Harvest: Pathogen	8	215.2	1.31	0.240
Cultivar: Pathogen	16	207.4	1.03	0.429
Harvest: Pathogen: Strain	8	218.1	2.31	0.021
Cultivar: Pathogen: Strain	16	208.7	1.16	0.305
Harvest: Genotype: Pathogen	30	215.8	0.90	0.627
Harvest: Cultivar: Pathogen: Strain	25	214.2	1.13	0.312

**Table S11.** ANOVA table for analysis of stem number of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num.a	Den. DFb	F-value	p-value
(Intercept)	1	2.0	0.14	0.741
Harvest	2	146.1	710.90	<0.001
Cultivar	4	146.3	134.80	<0.001
Pathogen	4	146.1	45.88	<0.001
Harvest: Cultivar	8	146.4	12.39	<0.001
Harvest: Pathogen	8	146.2	7.52	<0.001
Cultivar: Pathogen	16	146.4	3.61	<0.001
Harvest: Cultivar: Pathogen	32	146.5	2.20	0.001
Term	Num.a	Den. DFb	F-value	p-value
(Intercept)	1	2.0	0.14	0.741
Harvest	2	146.1	710.90	<0.001
Cultivar	4	146.3	134.80	<0.001
Pathogen	4	146.1	45.88	<0.001
Harvest: Cultivar	8	146.4	12.39	<0.001
Harvest: Pathogen	8	146.2	7.52	<0.001
Cultivar: Pathogen	16	146.4	3.61	<0.001
Harvest: Cultivar: Pathogen	32	146.5	2.20	0.001
Term	Num.a	Den. DFb	F-value	p-value
(Intercept)	1	2.0	0.14	0.741
Harvest	2	146.1	710.90	<0.001
Cultivar	4	146.3	134.80	<0.001
Pathogen	4	146.1	45.88	<0.001
Harvest: Cultivar	8	146.4	12.39	<0.001
Harvest: Pathogen	8	146.2	7.52	<0.001
Cultivar: Pathogen	16	146.4	3.61	<0.001
Harvest: Cultivar: Pathogen	32	146.5	2.20	0.001

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.

**Table S12.** ANOVA table for analysis of plant height of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2016 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	F-value	p-value
(Intercept)	1	1.9	52190.00	<0.001
Harvest	2	206.1	2120.00	<0.001
Cultivar	4	203.2	588.50	<0.001
Pathogen	4	202.8	25.03	<0.001
Harvest: Cultivar	8	206.4	96.01	<0.001
Pathogen: Strain	4	204.4	1.97	0.100
Harvest: Pathogen	8	205.5	0.87	0.546
Cultivar: Pathogen	16	202.6	1.49	0.108
Harvest: Pathogen: Strain	8	207.6	0.42	0.908
Cultivar: Pathogen: Strain	16	203.9	1.62	0.066
Harvest: Cultivar: Pathogen	30	206.0	1.12	0.309
Harvest: Cultivar: Pathogen: Strain	25	206.4	0.83	0.699

**Table S13.** ANOVA table for analysis of plant height of five winter cereals colonised by the four crown rot and common root rot pathogens in the 2017 field trial. Mean separations of  $\alpha < 0.05$ .

Term	Num. <sup>a</sup>	Den. DF <sup>b</sup>	F-value	p-value
(Intercept)	1	1.9	23370.00	<0.001
Harvest	2	120.7	2271.00	<0.001
Cultivar	4	117.9	227.10	<0.001
Pathogen	4	117.2	6.43	<0.001
Harvest: Cultivar	8	132.9	143.40	<0.001
Harvest: Pathogen	8	119.0	1.47	0.177
Cultivar: Pathogen	16	116.8	1.23	0.253
Harvest: Cultivar: Pathogen	22	118.2	1.38	0.138

<sup>a</sup>Num.: Numerator degrees of freedom. <sup>b</sup>Den. DF: Denominator degrees of freedom.

**Table S14.** Comparison of disease incidence (%) and DNA detection frequency (%) (**in bold**) of *Bipolaris sorokiniana* (Bs), *Fusarium culmorum* (Fc), *F. graminearum* (Fg), *F. pseudograminearum* (Fp) and non-inoculated control treatments ( $n=15$  for each of the four inoculation treatments and one non-inoculated control).

Frequency of detection of <i>Fusarium</i> spp. and <i>B. sorokiniana</i> DNA detection (%) <sup>a</sup> / Incidence of disease symptoms (%) <sup>b</sup>										
Treatment	cv. Endeavour		cv. Genie		cv. Grimmatt		cv. Hyperno		cv. Livingston	
<i>Fp</i>	<b>67.0</b>	100	<b>47.0</b>	73	<b>80.0</b>	100	<b>53.0</b>	100	<b>73.0</b>	100
<i>Fc</i>	<b>50.0</b>	100	<b>73.0</b>	93	<b>47.0</b>	100	<b>73.0</b>	100	<b>67.0</b>	100
<i>Fg</i>	<b>0.0</b>	93	<b>13.0</b>	80	<b>0.0</b>	100	<b>0.0</b>	100	<b>0.0</b>	93
<i>Bs</i>	<b>13.0</b>	93	<b>7.0</b>	73	<b>13.0</b>	93	<b>47.0</b>	100	<b>33.0</b>	100
Control <sup>c</sup>	<b>0.0</b>	96	<b>0.0</b>	78	<b>0.0</b>	97	<b>0.0</b>	96	<b>0.0</b>	97

<sup>a</sup> Percentage frequency of *Bipolaris sorokiniana*, *Fusarium culmorum*, *F. graminearum*, and *F. pseudograminearum* DNA in winter cereals cultivars (number of positive DNA detections / 15 = frequency of detection). <sup>b</sup> Percentage disease incidence of the plant that was used in the PCR assay (number of visually discoloured stems / 15 = incidence of symptoms treatment). <sup>c</sup> Non-inoculated control treatments for cv. Endeavour, cv. Genie, cv. Grimmatt, cv. Hyperno and cv. Livingston assessed with species-specific PCR primers for each pathogen.

**Table S15.** Comparison of average visual discolouration (VD) and DNA detection frequency of *Bipolaris sorokiniana* (Bs), *Fusarium culmorum* (Fc), *F. graminearum* (Fg), *F. pseudograminearum* (Fp) and non-inoculated control (%) (*n*=10-15 for each cultivar by inoculum combination).

Isolate	Cultivars	(+) VD (+) DNA % <sup>a</sup>	(-) VD (-) DNA % <sup>b</sup>	(+) VD (-) DNA % <sup>c</sup>	(-) VD (+) DNA % <sup>d</sup>	Total Sample Number	Average VD (%)	Notes
<i>Fp</i>	Endeavour	66.7	0.0	33.3	0.0	15	13	
<i>Fc</i>	Endeavour	50.0	0.0	50.0	0.0	10	7	
<i>Fg</i>	Endeavour	0.0	8.3	91.7	0.0	12	5	Most have 5% VD <sup>f</sup>
<i>Bs</i>	Endeavour	13.3	6.7	80	0.0	15	5	Most have 5%VD
Control <sup>e</sup>	Endeavour	0.0	6.7	93.3	0.0	15	5	Most have 5%VD
<i>Fp</i>	Genie	33.3	13.3	40.0	13.3	15	4	Most have 5%VD
<i>Fc</i>	Genie	66.7	0.0	26.7	6.7	15	6	Most have 5%VD
<i>Fg</i>	Genie	0.0	13.3	73.3	13.3	15	4	Most have 5%VD
<i>Bs</i>	Genie	0.0	20.0	73.3	6.7	15	4	Most have 5%VD
Control	Genie	0.0	26.7	73.3	0.0	15	4	Most have 5%VD
<i>Fp</i>	Grimmett	80.0	0.0	20.0	0.0	15	39	
<i>Fc</i>	Grimmett	40.0	0.0	60.0	0.0	15	11	
<i>Fg</i>	Grimmett	0.0	0.0	100	0.0	15	6	Most have 5%VD
<i>Bs</i>	Grimmett	13.3	6.7	80.0	0.0	15	5	Most have 5%VD
Control	Grimmett	0.0	6.7	93.3	0.0	15	5	Most have 5%VD
<i>Fp</i>	Hyperno	60.0	0.0	40.0	0.0	15	56	
<i>Fc</i>	Hyperno	73.3	0.0	26.7	0.0	15	24	
<i>Fg</i>	Hyperno	0.0	0.0	100	0.0	15	5	All have 5% VD
<i>Bs</i>	Hyperno	40.0	0.0	60.0	0.0	15	10	
Control	Hyperno	0.0	20.0	80.0	0.0	15	5	Most have 5%VD
<i>Fp</i>	Livingston	71.4	0.0	28.6	0.0	14	39	
<i>Fc</i>	Livingston	73.3	0.0	26.7	0.0	15	12	
<i>Fg</i>	Livingston	0.0	6.7	93.3	0.0	15	5	Most have 5%VD
<i>Bs</i>	Livingston	33.3	0.0	66.7	0.0	15	5	Most have 5%VD
Control	Livingston	0.0	6.7	93.3	0.0	15	8	Most have 5%VD

a Percentage of the plants with visual symptoms and DNA of *Fusarium* Species and *Bipolaris sorokiniana* in five winter cereal species cultivars; b Percentage of the plants without visual symptoms or DNA of *Fusarium* Species and *Bipolaris sorokiniana* in five winter cereal species cultivars; c Percentage of the plants with the visual symptom but no DNA of *Fusarium* Species and *Bipolaris sorokiniana* in five winter cereal species cultivars; d Percentage of the plants without visual symptoms but with DNA of *Fusarium* Species and *Bipolaris sorokiniana* in five winter cereal species cultivars.; e Non-inoculated control treatment; f Visual discolouration rating.