

[10.1071/CP23065](https://doi.org/10.1071/CP23065)

Crop & Pasture Science

Supplementary Material

Production losses caused by red leather leaf in hay and milling oats

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Supplementary Table S1. Red leather leaf severity (% leaf area affected) of hay oat varieties during stem elongation and flowering in response to disease and fungicide treatments in four experiments in 2019 and 2020.

Mean disease severity (percent leaf area affected) logit transformation values in parenthesis ^A								
Variety	Medium rainfall zone				High rainfall zone			
	Vectis 2019		Longerenong 2020		Inverleigh 2019		Inverleigh 2020	
	22-Jul	16-Aug	21-Jul	7-Sep	23-Jul	21-Aug	14-Aug	1-Oct
<i>Disease</i>	Z31	Z32	Z31	Z51	Z25	Z31	Z31	Z61
Forester	2.2 ^{bc}	2	4 (-3.2) ^e	4 (-3.3) ^d	6	4 (-3.4)	4 (-3.2) ^{fg}	2 (-4.2) ^c
Tungoo	3.5 ^d	4	2 (-3.9) ^{bc}	1 (-4.4) ^a	- ^B	-	-	-
Williams	4.8 ^{ef}	16	3 (-3.5) ^d	3 (-3.5) ^{cd}	15	15 (-1.7)	2 (-4.1) ^{de}	7 (-2.7) ^e
Brusher	4.2 ^{de}	12	6 (-2.9) ^{fg}	7 (-2.7) ^e	14	13 (-1.9)	3 (-3.5) ^{ef}	5 (-2.9) ^{de}
Mulgara	5.7 ^{gh}	18	5 (-3.1) ^{ef}	13 (-1.9) ^g	27	35 (-0.6)	4 (-3.3) ^{fg}	29 (-0.9) ^g
Yallara	6.3 ^h	19	6 (-2.8) ^{fg}	10 (-2.3) ^f	23	27 (-1.0)	8 (-2.5) ^h	18 (-1.5) ^f
Wintaroo	5.2 ^{fg}	20	7 (-2.6) ^g	12 (-2.0) ^{fg}	21	31 (-0.8)	6 (-2.8) ^{gh}	8 (-2.5) ^e
<i>Fungicide</i>								
Forester	1.3 ^a	1	5 (-3.1) ^{ef}	2 (-3.8) ^{bc}	- ^C	2 (-4.1)	3 (-3.7) ^{def}	1 (-5.0) ^b
Tungoo	1.5 ^{ab}	2	2 (-4.0) ^b	1 (-4.5) ^a	-	-	-	-
Williams	2.2 ^{bc}	7	2 (-3.8) ^{bcd}	1 (-4.5) ^a	-	6 (-2.7)	0 (-6.7) ^a	0 (6.0) ^a
Brusher	2.3 ^c	7	5 (-2.9) ^{ef}	3 (-3.5) ^d	-	5 (-3.0)	2 (-4.1) ^{cd}	1 (-4.3) ^c
Mulgara	2.5 ^c	11	1 (-4.4) ^a	1 (-4.4) ^a	-	20 (-1.4)	0 (-5.8) ^b	4 (-3.3) ^d
Yallara	2.7 ^c	12	5 (-3.0) ^{ef}	2 (-3.8) ^{bc}	-	13 (-1.9)	1 (-4.7) ^c	2 (-4.2) ^c
Wintaroo	2.2 ^{bc}	11	3 (-3.7) ^{cd}	2 (-3.9) ^b	-	17 (-1.5)	0 (-6.3) ^{ab}	1 (-4.7) ^{bc}
Variety								
<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
LSD (0.05)	0.5	0.22	0.19	0.21	3.2	0.37	0.44	0.37
Treatment								
<i>P</i>	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
LSD (0.05)	0.3	0.18	0.1	0.11	-	0.21	0.25	0.22
Variety × Treatment								
<i>P</i>	<0.001	0.269	<0.001	<0.001	-	0.828	<0.001	<0.001
LSD (0.05)	0.7	<i>ns</i>	0.27	0.29	-	<i>ns</i>	0.62	0.53

^ALinear mixed model was used for analysis. Shapiro-Wilk test for normality at $P < 0.001$, therefore logit transformation of RLL severity (in parenthesis). LSDs were calculated for transformed means and should be applied only for logit transformed means. Back transformed values are presented before parenthesis. Fisher's protected LSD (0.05) was applied to compare treatment by variety means. Within a column the same letters are not significantly different.

^BTungoo was only tested in medium rainfall zone at Vectis and Longerenong in 2019 and 2020, respectively.

^CData not collected.

Supplementary Table S2. Red leather leaf severity (% leaf area affected) of milling oat varieties during stem elongation and flowering in response to disease and fungicide treatments in four experiments in 2019 and 2020.

Mean disease severity (percent leaf area affected) logit transformation values in parenthesis ^A								
Variety	Medium rainfall zone				High rainfall zone			
	Vectis 2019		Longerenong 2020		Inverleigh 2019		Inverleigh 2020	
	22-Jul	16-Aug	17-Jul	7-Sep	22-Jul	22-Aug	13-Aug	1-Oct
<i>Disease</i>	Z31	Z32	Z30	Z55	Z30	Z31	Z33	Z63
Williams	4.0 ^d	14.5	3.0 ^b	7 (-2.8) ^c	14.6	17.7	10 (-2.2) ^c	13.0 ^c
Bannister	5.2 ^f	16.2	4.8 ^{cd}	16 (-1.7) ^d	17.9	30.6	21 (-1.3) ^e	31.3 ^e
Bilby	4.8 ^{ef}	14.3	3.8 ^{bc}	15 (-1.7) ^d	18.5	24.9	17 (-1.6) ^{de}	19.4 ^d
Yallara	6.3 ^g	20.2	7.3 ^e	16 (-1.6) ^d	22.5	29.2	13 (-2.0) ^{cd}	18.6 ^d
Mitika	5.3 ^f	15.7	6.3 ^e	23 (-1.2) ^e	12.9	18.9	12 (-2.1) ^{cd}	32.2 ^e
Kowari	4.2 ^{de}	13.2	5.0 ^d	19 (-1.5) ^{de}	11.6	15.8	10 (-2.2) ^c	37.8 ^f
<i>Fungicide</i>								
Williams	1.7 ^a	7.3	1.0 ^a	2 (-4.1) ^a	- ^B	7.5	1 (-6.0) ^a	1.6 ^a
Bannister	2.2 ^{abc}	8.3	1.5 ^a	3 (-3.7) ^b	-	15.2	1 (-5.0) ^b	5.6 ^{ab}
Bilby	1.8 ^{ab}	8	1.3 ^a	3 (-3.6) ^b	-	15.1	1 (-4.7) ^b	4.3 ^{ab}
Yallara	2.2 ^{abc}	10.8	1.7 ^a	3 (-3.4) ^b	-	18.9	1 (-4.5) ^b	3.2 ^{ab}
Mitika	2.7 ^c	9.8	1.8 ^a	5 (-3.0) ^c	-	11.2	1 (-5.0) ^b	4.1 ^{ab}
Kowari	2.5 ^{bc}	6.8	1.2 ^a	3 (-3.6) ^b	-	7.4	0 (-5.7) ^a	7.0 ^b
Variety								
<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
LSD (0.05)	0.58	1.72	0.74	0.21	1.75	3.92	0.43	3.7
Treatment								
<i>P</i>	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
LSD (0.05)	0.33	0.96	0.43	0.12	-	2.2	0.25	2.2
Variety × Treatment								
<i>P</i>	0.003	0.317	<0.001	0.004	-	0.442	0.039	<0.001
LSD (0.05)	0.81	ns	1.1	0.3	-	ns	0.61	5.3

^ALinear mixed model was used for analysis. Shapiro-Wilk test for normality at $P < 0.001$, therefore logit transformation of RLL severity (in parenthesis). LSDs were calculated for transformed means and should be applied only for logit transformed means. Back transformed values are presented before parenthesis. Fisher's protected LSD (0.05) was applied to compare treatment by variety means. Within a column the same letters are not significantly different.

^BData not collected.

Supplementary Table S3. Summary of Wald tests for fixed effects for red leather leaf severity (% leaf area affected) of milling oats at milk development in four experiments in 2019 and 2020.

Term	d.f.	Wald	Pwald ^A
(Intercept)	1	6498.9	0.000
Experiment	3	414.1	0.000
Treatment	1	467.5	0.000
Variety	5	219	0.000
Experiment:Treatment	3	79.8	0.000
Experiment:Variety	15	103.7	0.000
Treatment:Variety	5	20.2	0.001
Experiment:Treatment:Variety	15	52.8	0.000

^AAll examined terms were significantly different.

Supplementary Table S4. Summary of Wald tests for fixed effects for grain yield of milling oats in four experiments in 2019 and 2020.

Term	d.f.	Wald	Pwald ^A
(Intercept)	1	27502.1	0.000
Experiment	3	489.6	0.000
Treatment	1	1072.8	0.000
Variety	5	3215.2	0.000
Experiment:Treatment	3	54	0.000
Experiment:Variety	15	964.7	0.000
Treatment:Variety	5	38.7	0.000
Experiment:Treatment:Variety	15	54.1	0.000

^AAll examined terms were significantly different.