

# Managing crown rot on upper Eyre Peninsula

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**Location**  
Buckleboo  
Buckleboo Farm Improvement Group

**Rainfall**  
Av. Annual: 297 mm  
Av. GSR: 195 mm  
2023 Total: 280 mm  
2023 GSR: 160 mm

**Yield**  
Potential: potential yield calculator – 2.53 t/ha (good finish); 1.26 t/ha (poor finish)  
Actual: 1.08-2.14 t/ha (W); 1.76-2.18 t/ha (B).

**Paddock history**  
2023: Wheat  
2022: Barley  
2021: Barley  
2020: Lentils

**Soil type**  
Sandy loam

**Soil test**  
PREDICTA® B analysis showed inoculum of the following stem-base/root diseases was present at the site: high risk - crown rot; low risk - take-all, rhizoctonia, *Pratylenchus neglectus* and pythium.

**Plot size**  
12 m x 2 m

**Trial design**  
Variety - blocked split-plot x 4 reps.  
Inoculum carryover - paired plots x 8 reps.

**Yield limiting factors**  
Moisture stress during flowering/ grain filling. Mouse damage during flowering and grain filling.

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**Location**  
Mitchellville  
Franklin Harbour Agricultural Bureau

**Rainfall**  
Av. Annual: 282 mm  
Av. GSR: 190 mm  
2023 Total: 309 mm  
2023 GSR: 160 mm

**Yield**  
Potential: potential yield calculator – 2.40 t/ha (good finish); 1.20 t/ha (poor finish)  
Actual: 1.14-2.61 t/ha (W); 1.37-2.33 t/ha (B).

## Key messages

- **VICTRATO** (registration pending, January 2025) is a Syngenta fungicide product used as a seed dressing for managing crown rot. In replicated field trials on upper Eyre Peninsula (UEP) in 2022 and 2023, this product demonstrated efficacy against crown rot. Effects were large enough to give profitable yield improvements and reductions in crown rot inoculum carryover.
- **VICTRATO will be a useful addition to the strategies currently available for crown rot management. However, VICTRATO® is not “a silver bullet” and should be pyramided with other management options, not used stand-alone.**
- **When considering using VICTRATO: determine if there is a risk of yield loss due to crown rot; base your profitability calculations on the t/ha yield potential in the paddock; remember higher sowing rates have higher VICTRATO application costs.**
- **With a management option that reduces crown rot expression and inoculum carryover, it is important to check for crown rot risk - either by PREDICTA B or by checking for incidence of stem base browning in cereals before or soon after harvest.**
- **Sowing deep reduced plant densities and yields, even for long coleoptile varieties, but did not change yield responses to VICTRATO. Soil**

**moisture was not limiting at sowing in this project, so in seasons with limiting soil moisture at sowing, findings might differ. If sowing deep, consider increasing sowing rates.**

## Why do the trial?

Crown rot is a fungal disease of cereals caused by *Fusarium pseudograminearum* and/or *F. culmorum*. Symptoms include basal stem browning (diagnostic), scattered white heads and pink fungal growth (diagnostic) inside/on stem bases. Crown rot fungi cause significant yield losses in cereals and have a wide host range amongst cereals and grasses.

High cereal cropping intensity, wide-spread adoption of stubble retention and reduced tillage have all contributed to increased crown rot issues in farming systems. No fungicides are currently available for managing crown rot in-crop and cultivar resistance is limited. Rotation is helpful, but a two to four year break from cereal is needed to reduce high crown rot levels to low levels.

Consultation with growers across Eyre Peninsula found management of crown rot is a high-ranking issue in the low rainfall areas of Cowell and Kimba on UEP. Prior crown rot research at Mitchellville indicated that low crown rot expression produced more yield loss than seen in higher rainfall areas. Findings from this research imply that crown rot management options used in higher rainfall zones should be validated on UEP.

#### Paddock history

2023: Wheat  
2022: Medic pasture  
2021: Barley  
2020: Wheat

#### Soil type

Sandy loam over carbonate layer

#### Soil test

PREDICTA B analysis showed inoculum of the following stem-base/root diseases was present at the site: medium risk - crown rot; low risk - common root rot, *Pratylenchus neglectus* and pythium.

#### Plot size

12 m x 2 m

#### Trial design

Variety - blocked split-plot x 4 reps.  
Inoculum carryover - paired plots x 8 reps. Sowing depth - blocked split-plot x 8 reps.

#### Yield limiting factors

Moisture stress during flowering/  
grain filling

learning experience' published in the EPFS Summary 2023, p. 196.

### How was it done?

Field trials (Table 1) were established on UEP in 2022 and 2023 at Buckleboo and Mitchellville after consultation with the Buckleboo Farm Improvement Group (BIGFIG) and Franklin Harbour Agricultural Bureau. Trial sites with a medium to high risk of yield loss due to crown rot were selected. Only naturally occurring crown rot inoculum was used in trials, to ensure treatments were applied under conditions present in commercial paddocks.

In variety x \*VICTRATO trials, six (2022) or seven (2023) bread wheat varieties and one barley variety were sown in paired plots with and without VICTRATO seed dressing. Bread wheat entries had a range of maturities, as maturity can influence crown rot responses, and different crown rot resistance ratings. Depth of sowing trials compared a standard (normal) sowing depth of 2.5 cm with a sowing depth of 5 cm.

The same seed sources were used for all trials. VICTRAT was supplied by Syngenta Australia and applied to seed at a total solution rate of

600 mL/100 kg seed. Trial designs and data analyses were provided by SN Stats.

Plant samples (8 x 10 cm samples per plot) were taken at early grain filling to provide data on plant densities, head numbers, white head numbers and crown rot expression (visual incidence, browning score) on main stem bases. At the start of 2024, soil samples were taken from the inoculum carryover trials and sent for PREDICTA B analysis. Grain yield and quality (screenings, protein, test weight) were also recorded.

### What happened

The high incidence of crown rot on main stems was consistent with all sites having medium to very high risk of yield losses due to crown rot (as indicated by soil DNA in Table 2). Mild seasonal conditions meant high crown rot incidence did not result in the high levels of stem browning and white head expression expected at these sites. Despite this, average browning scores had potential to reduce yield (Table 2).

VICTRATO (with Tymirium chemistry) is a Syngenta seed applied fungicide in the process of being registered for assisting in managing crown rot. VICTRATO seed dressing (VSD) has improved cereal yields in medium and high rainfall areas in the presence of crown rot, but no information is available for low rainfall environments.

This article summarises the two seasons of the project. Results from 2022 are presented in the article 'Managing crown rot on upper Eyre Peninsula - a joint

**Table 1. Replicated trials undertaken on upper Eyre Peninsula.**

Trial type	2022		2023	
	Buckleboo	Mitchellville	Buckleboo	Mitchellville
Variety*VICTRATO	✓	✓	✓	✓
Depth*VICTRATO	✓			✓
Depth*Variety	✓			
Depth*Calibre				✓
Inoculum carryover			✓	✓

**Table 2. Agronomic information and crown rot expression (untreated plots) at sites.**

	2022		2023	
	Buckleboo	Mitchellville	Buckleboo	Mitchellville
Site soil DNA (pg/g) <sup>1</sup>	6,542	23,017	2,135	172
Sowing date	May 9	May 9	May 2	May 4
Site (Av.) GSR mm	350 (195)	215 (190)	160 (195)	160 (190)
Scepter yield t/ha	3.42	2.89	1.67	2.33
<b>Crown rot expression:</b>				
Incidence %	94	97	77	82
Browning score (0-5) <sup>2</sup>	2.10	2.19	1.56	1.70
White heads %	5	7	4	4

<sup>1</sup> PREDICTA B risk categories for yield loss in wheat: Medium = 32-<316; High = >316.

<sup>2</sup> Yield loss risk: Nil = 0; Low = >0-1.5; Some = >1.5-2.5; Medium = >2.5-3.5; High = >3.5->5.

**Table 3. Effects of VICTRATO seed dressing (VSD) on crown rot expression in Calibre (paired plots, eight replicates) at Buckleboo and Mitchellville in 2023.**

	Visual incidence (%)		Browning score (0-5)	
	No VICTRATO	VICTRATO	No VICTRATO	VICTRATO
<b>Average:</b>				
Buckleboo	85	67	2.05	1.28
Mitchellville <sup>2</sup>	74	58	1.66	0.91
<b>Range:</b>				
Buckleboo	79-89	54-81	1.73-2.75	0.87-1.89
Mitchellville	61-86	48-68	1.15-2.07	0.70-1.08

<sup>1</sup> VSD P-values at Buckleboo: Incidence P-value = 0.001; Browning score P-value = 0.001.

<sup>2</sup> VSD P-values at Mitchellville: Incidence P-value = 0.001; Browning score P-value = 0.001.

**Table 4. Yield responses of Calibre to VICTRATO seed dressing in two paired plot (treated and untreated) trials, 2023.**

Replicate	Buckleboo		Mitchellville	
	%	t/ha	%	t/ha
1	-1	-0.02	19	0.40
2	31	0.41	17	0.36
3	31	0.34	0	0.01
4	12	0.15	12	0.25
5	29	0.42	5	0.12
6	29	0.38	1	0.03
7	2	0.04	4	0.10
8	4	0.07	5	0.11
Average	17	0.22	8	0.17
VICTRATO P-value		P = 0.001		P = 0.013
Untreated Calibre yield	1.44		2.25	

Crown rot responses

VICTRATO reduced crown rot incidence and basal stem browning scores (Table 3) and this effect was not influenced by variety. The wide range in results (Table 3) across eight replicates is typical of the spatial variability seen in crown rot expression.

Yield responses

Responses to VICTRATO were spatially variable (Table 4), presumably due to spatial variations in crown rot inoculum levels and soil type. On average, however, there were positive yield responses to VICTRATO (Table 4 and Table 5).

An unexpected yield loss of 22% in Commodus barley at Mitchellville (Table 5) appears to be due to the combination of season, soil and site conditions at that site in 2023. Good early growth with production of many tillers promoted by VICTRATO in the presence of crown rot, was followed by an extended period of moisture stress. Yield losses are unlikely to occur often in barley (one occurrence in seven trials, 2020-2023) and are unlikely to occur in bread wheat varieties, which have different tillering habits than barley.

Profitability

When VICTRATO was applied to seed in cereal crops in paddocks with medium to high risk of yield

losses due to crown rot, yield improvements were large enough to return a small margin of profit (Table 6). Combined with some reduction in carryover of crown rot inoculum, this makes VICTRATO an attractive proposition for crown rot management in low rainfall zones.

When considering VICTRATO application, use t/ha improvements to calculate profit margins, rather than percentage yield improvements. For example, at Mitchellville, an 8% yield improvement in a 2.25 t/ha crop led to a similar t/ha advantage to that seen for a 17% yield improvement in the 1.44 t/ha crop at Buckleboo (Table 6).

Table 5. Average yield changes (%) due to VICTRATO seed dressing. Trials were laid out in a paired plot (treated and untreated) design with four replicates.

Ratings <sup>1</sup>	Maturity <sup>2</sup>	Varieties	Yield changes (%) in 2022		Yield changes (%) in 2023	
			Buckleboo	Mitchellville	Buckleboo	Mitchellville
MSS	VQ-Q	Emu Rock	0	6	4	-1
S	Q	Vixen	8	10	8	2
MSS	Q-M	Anvil	5	7	4	7
S	Q-M	Razor	1	10	3	8
U	Q-M	Calibre	11	6	3	8
S	M	Scepter	4	2	10	8
MS	M-L	Trojan	na	na	10	3
-	Q-M	Commodus	12	7	7	-22
Scepter yield untreated (t/ha)			3.91	2.82	1.56	1.60

<sup>1</sup> U=Unknown; S=Susceptible; MS=Moderately susceptible; MSS=MS to S

<sup>2</sup> Q=Quick; M=Mid; L=Late; VQ=Very quick

Table 6. VICTRATO effects on yield (% and t/ha) and profitability, assuming: 70 kg/ha sowing rate (rate influences costs); \$22.40/ha for VICTRATO (\$160/L estimated cost ex GST @ 200 mL/100 kg grain); \$380/tonne (AH1 delivered to Lucky Bay T Ports).

	Buckleboo			Mitchellville		
	%	t/ha	\$/ha	%	t/ha	\$/ha
Average	17	0.22	62	8	0.17	42
Range	0-31	0.00-0.42	-30-136	0-19	0.01-0.40	-19-128
	Calibre yield untreated: 1.4 t/ha			Calibre yield untreated: 2.25 t/ha		

### ***Inoculum carryover***

VICTRATO application to seed in 2023 reduced crown rot expression in-crop (Table 3), leading to inoculum reductions at the start of 2024 (Table 7). Reductions in inoculum levels of 31% (Buckleboo) and 77% (Mitchellville) did not reduce the PREDICTA B risk category for a 2024 cereal crop, due to the very high inoculum levels at the sites in 2023. Combining VICTRATO in-crop with a break from cereal is likely to have good efficacy for reducing even very high crown rot inoculum levels, to low levels in the medium to long term.

Sowing deep to “chase moisture” for germination is common practice on UEP. Growers asked

that this treatment be included in trials as deep sowing effects on responses to VSD are unknown.

Deep sowing decreased plant densities, increased heads/plant (responding to decreased plant densities) and decreased yields, except at Buckleboo in 2022, where there was no effect on yield (Table 8). Long coleoptile varieties (Mace LC, Valiant CL, Yitpi LC) also exhibited lower yields when deep sown. Average yield decreases due to deep sowing ranged from 5% to 32%.

Deep sowing did not affect crown rot incidence or browning score, except at Mitchellville in 2023 where these parameters decreased with deep sowing (note

that seed was sown very deep due to row in-filling), but did not affect these parameters in other trials.

For both sowing depths at Mitchellville in 2023, VSD increased yields, but there was no response to VICTRATO at either sowing depth at Buckleboo in 2022. There was no interaction between sowing depth and efficacy of VICTRATO.

At Mitchellville in 2023, the Calibre sowing depth trial (no VICTRATO treatment) was on very light soil. In this trial, sand in-filled the row after sowing. In the deep sown treatments, this meant seed was up to 11 cm below the soil surface - much deeper than expected.

**Table 7. Effects of VICTRATO applied to seed in 2023 on crown rot inoculum concentrations (pg fungal DNA/g of sample as measured by PREDICTA B analysis) at the start of 2024 (Calibre, paired plots, eight replicates).**

	<b>Buckleboo</b>		<b>Mitchellville</b>	
	<b>Control</b>	<b>+VSD</b>	<b>Control</b>	<b>+VSD</b>
Average	5057	3473	6210	1401
P-value for VSD	VSD P-value = 0.001		VSD P-value = 0.003	
Change due to VSD	31% decrease		77% decrease	
Range	2152-10302	838-10128	1725-15303	19-2420

**Table 8. Sowing depth and VICTRATO seed dressing (VSD) effects on crown rot expression and yield, Buckleboo 2022.**

<b>Treatment</b>	<b>Plants /m row</b>	<b>Heads / plant</b>	<b>Incidence (%)</b>	<b>Score (0-5)</b>	<b>White heads (%)</b>	<b>Yield (t/ha)</b>
<b>Normal</b>	<b>31</b>	<b>2.7</b>	<b>85</b>	<b>1.48</b>	<b>0.3</b>	<b>4.74</b>
Deep	24	3.3	78	1.27	1.7	4.55
Normal + VSD	32	2.5	73	1.16	0.5	4.76
Deep + VSD	24	3.0	77	1.16	0.5	4.76
Depth P-value	0.003	0.016	ns	ns	ns	ns
VSD P-value	ns	0.003	ns	0.024	ns	ns
VSD = VICTRATO Seed Dressing. Normal sowing depth = 2.5 cm; Deep sown = 5 cm.						



## What does this mean?

The effects of VICTRATO begin with reductions in crown rot incidence and severity, leading to yield and profitability improvements in-crop and some reduction in inoculum carryover to the next season. The immediate yield and profitability outcomes combined with the longer-term effect on crown rot inoculum makes VICTRATO a useful addition to current crown rot management strategies.

VICTRATO is not a ‘silver bullet’ and should not be used as a stand-alone option. Rather, it should be combined with other crown rot management strategies.

When planning to use VICTRATO in a paddock, ensure that paddock has a medium to high risk of yield loss from crown rot. Consider sowing rate (higher rates increases VICTRATO cost) and base profitability calculations on t/ha yield potential for individual paddocks (a 10% yield improvement in a 2 t/ha crop is 0.2 t/ha but in a 4 t/ha crop is 0.4 t/ha).

Positive average yield responses to VICTRATO were seen in bread wheat (1%-11%) and barley (7%-12%) in 2022 and 2023, despite limited crown rot expression. This level of response

is consistent with lower-end responses seen at medium and high rainfall sites in South Australia. Although small and spatially variable, yield responses in the low rainfall environment of UEP were sufficient to provide a profitable outcome.

An unexpected 22% reduction in average barley yield occurred at Mitchellville in 2023 - the only negative average yield response seen in barley in seven trials between 2020 and 2023 in South Australia. It appears barley may show a negative yield response to VICTRATO if conditions promote good early growth and tillering that cannot be supported during grain filling.

Yield response to VICTRATO was not affected by bread wheat variety (maturity or crown rot resistance rating), so variety selection can be made based on general performance. VICTRATO will not return yields to those seen in the absence of crown rot. Where crown rot inoculum is at a medium to high risk level and conditions are conducive, white head expression can still occur in crops where seed was treated with VICTRATO.

Sowing deep (simulating “chasing moisture”) in seasons when moisture was not limiting did not affect responses to VICTRATO,

but reduced yields due to decreased plant establishment. Long coleoptile varieties did not perform better than varieties with normal coleoptile lengths. Consider increasing sowing rate to increase plant density if sowing deep.

On very light soils, there can be in-filling of rows that results in seed being deeper than expected, which can be particularly problematic if sowing deep. Slight increases in sowing depth and increasing sowing rate, may assist in reducing yield losses.

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