

Stockade Agronomy Summary (LPB16-0598)



Variety Summary

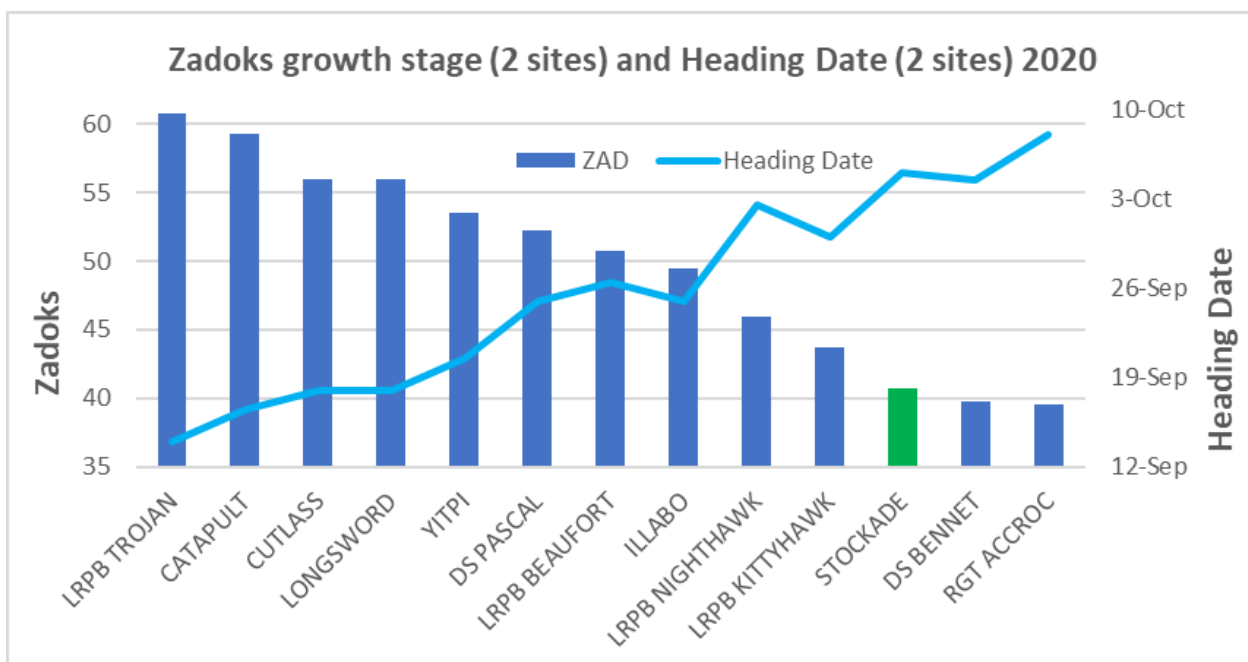
- A high yielding Very Slow Maturity Spring wheat with an excellent canopy that suits high production to compete with the Red Wheats currently being grown in the High Rainfall Zone (HRZ)
- White grained wheat with *APW Milling classification* for 2023 harvest.
- Comparable maturity to Accroc making it best suited to the HRZ regions of SE SA, SW Vic and Tas
- Has shown good toughness and broad soil adaption to deliver high yields beyond these regions when early seeding opportunities arise in more Main Season areas of the Medium/High Rainfall in Vic and SA

Breeding Background

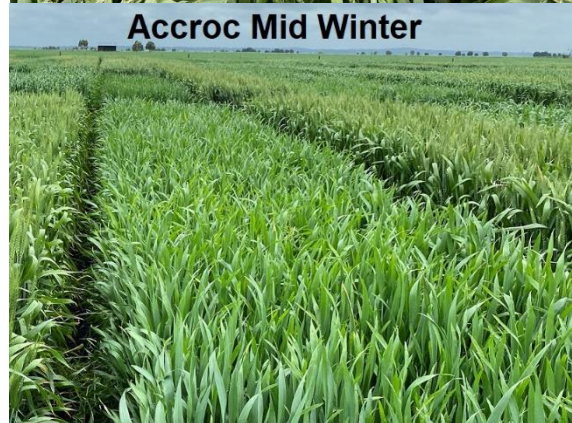
- The cross for Stockade (tested as LPB16-0598) was made by LongReach Plant Breeders between LRPB Trojan and a LongReach breeding line that was specifically selected for high disease resistance
- A doubled haploid line was developed from the F1 seed in 2015
- The line has been extensively evaluated in the LongReach trial program Early Season Program and was first yield tested in 2016
- First entered in NVT Early Season and Long Season trials in Vic and SA in 2021

Agronomic Features

- Has a medium length coleoptile similar to Trojan with good establishment. Similar to other slower maturity lines like Beaufort/Accroc with steady early vigour as tillering takes a priority to set up biomass and yield potential
- An erect plant type with medium-long flag leaf that closes the canopy well and good tillering to produce a good number of medium size heads.
- Medium plant height similar to Trojan with good lodging tolerance even under high production situations
- Very Slow Spring maturity that is 5-10 days later than Beaufort and similar to Accroc in heading time
- Fully awned & white chaffed and that has shown to be low shattering (RMR)
- Shown similar tolerance to Black Point (MS to MRMS) to Trojan and Illabo in LongReach screens
- Has a Boron Tolerance gene and shown good tolerance to Boron (MT) and very good Acid tolerance (TMT) in LongReach abiotic screens



Maturity on 5th October, Conmurra Early Sown NVT SA (Sown 20th April 2022)



Stockade maturity 26th October, Minnipa Early Sown NVT SA (Sown 19th April 2022)



Disease Profile

- Good resistance to Leaf Rust (MR), moderately resistant to Stripe rust (MR) and moderately susceptible to Stem Rust (MS)
- Very good resistance to the newer pathotypes with Stripe rust rating (MR) increased in 2022 screening trials
- Good resistance to *Septoria tritici* (MS), which is essential for a HRZ variety, good resistance to Yellow Spot (MRMS) but susceptible to Powdery Mildew (SVS)
- Disease ratings have been updated after reviewing extensive data from the high-pressure 2022 season with Stockade impressing in disease screens against high levels of Septoria and Stripe Rust to emphasise its excellent disease credentials

2023 NVT disease rating (3/3/23)

Variety	Leaf Rust Res	Stem Rust Res	Stripe Rust Res (East)	Black Point Res	CCN Res	Crown Rot Res	Septoria Tritici Res	Yellow Leaf Spot Res	Powdery Mildew Res
BigRed	MRMS	S	RMR		S	S (P)	MR	MR	RMR
DS Bennett	SVS	MS	S	MSS	S	VS	MSS	MRMS	R
LRPB Beaufort	MSS	SVS	RMR	MRMS	MS	S	S	MRMS	RMR
LRPB Trojan	MR#	MRMS	S	MS	MS	MS	S	MSS	S
RGT Accroc	SVS	MS	RMR	MRMS	S	SVS	MS	MRMS	MSS
RockStar	S	MRMS	S	MSS	MSS	S	S	MRMS	SVS
Stockade	MR (P)	MS	MR	MS*	MRMS	S	MS	MRMS	SVS
Willaura	MRMS	MR	S		MS	S	S	MS	S

*LongReach Blackpoint rating as no NVT rating available



Stockade standing up to Stripe Rust - Charlton NVT Unsprayed Pathology trial, 2022



Stockade showing excellent standing ability in a wind impacted year at Streatham
Early Sown NVT trial on 28th October (sown 10th May 2022)



LRPB Beaufort (LHS), Stockade (center) and LRPB Trojan (RHS) standing ability in
a windy year at Inverleigh Early Sown NVT trial on 28th October (sown 4th May 2022)



Canopy structure of LRPB Beaufort (LHS) compared to Stockade (RHS) at LongReach Early Sown Rupanyup trial on 2nd November (sown 28th April 2022)

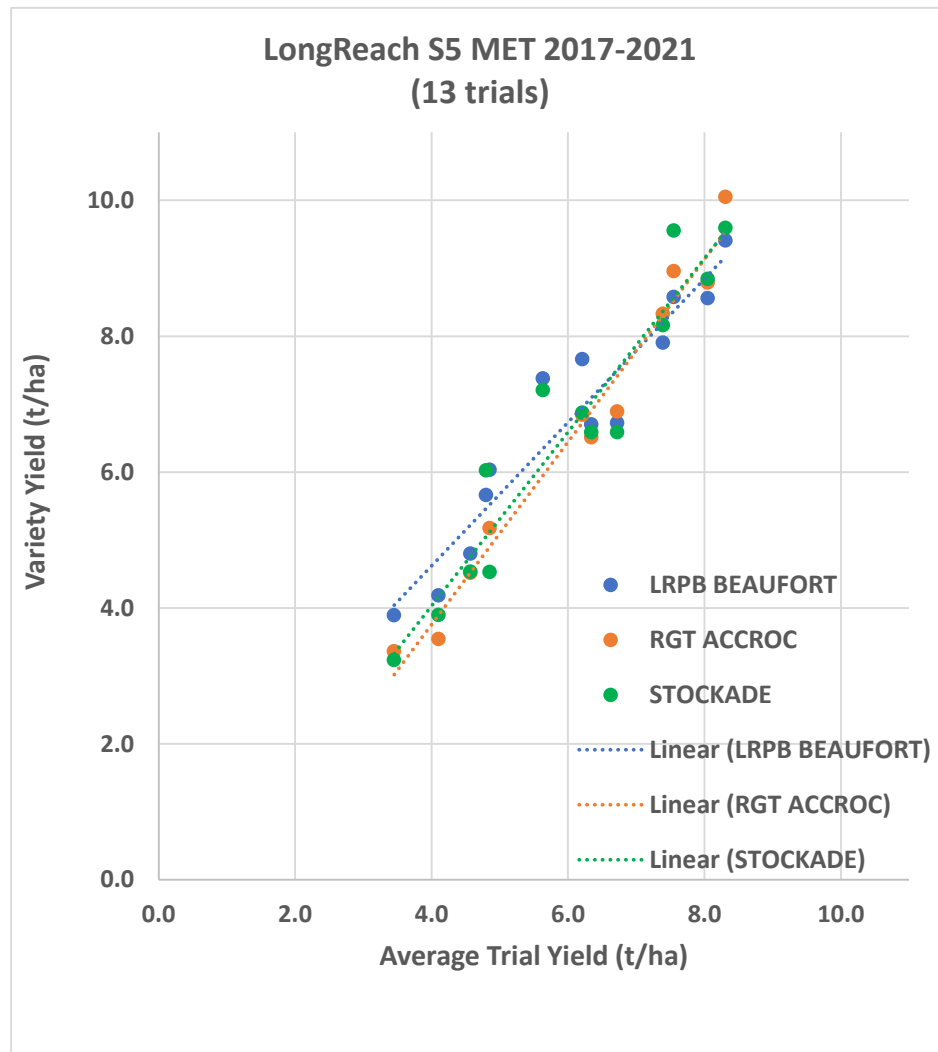


Canopy structure of Stockade at NVT Early Sown Irrigated Numurkah trial on 4th November (sown 2nd May 2022)

Yield Performance

- Stockade has demonstrated its serious top end yield that can match the leading Red Wheat varieties like RGT Accroc and LRPB Beaufort in the HRZ with a white grained wheat to broaden delivery options for growers
- Regression data comparisons from LongReach MET data show Stockade has the ability to match RGT Accroc in higher production areas that suit the Slower maturing varieties (>6t/ha) while varieties like LRPB Beaufort start to drop away

Yield Summary LPB trials MET data:



Yield Summary LPB Individual sites 2017-2021: (increasing order of yield)

VARIETY	Tarlee 2019	Riverton 2018	Tarlee 2020	Tarlee 2020	Conmurra 2017	Conmurra 2021	Conmurra 2018	2018	Inverleigh	Riverton 2017	Inverleigh 2019	Inverleigh 2020	Conmurra 2020	Conmurra 2019	Ave ALL trials	MET Ave 17-20
LRPB BEAUFORT	3.90	4.19	4.80	5.66	6.03	7.38	7.66	6.70	6.73	7.90	8.58	8.56	9.41	113	110	
RGT ACCROC	3.36	3.54	4.52		5.18		6.85	6.51	6.89	8.33	8.96	8.79	10.05		106	
STOCKADE	3.23	3.90	4.53	6.02	4.53	7.21	6.88	6.59	6.59	8.16	9.56	8.84	9.59	108	105	
LRPB TROJAN	3.76	4.46	5.09	3.45	5.91	4.86	6.46	6.80	7.37	7.88	6.14	8.19	8.99	102	106	
CATAPULT			5.00	5.16		4.90						7.88	7.61		104	
CUTLASS	3.97	4.40	4.64		5.67		6.76	6.57	7.20	6.89	6.60	7.81	6.86		102	
DS BENNET	3.22	3.77	4.38		5.04		6.66	5.96	6.38	7.04	7.24	8.94	8.75		99	
DS PASCAL	3.20	3.81	4.35	3.94	4.67	6.22	6.08	6.10	6.41	7.46	7.97	8.39	8.77	98	98	
LONGSWORD	3.72	3.76	4.42				6.78	5.52		6.09	7.40	8.21	8.21		98	
ILLABO	3.21	3.69	4.19	3.94	4.71	6.22	6.33	6.05	6.40	7.18	8.15	7.93	8.16	97	97	
LRPB NIGHTHAWK	3.00	3.90	4.10		4.91		5.50	5.71	6.56	6.83	8.07	7.42	7.87		94	
LRPB KITTYHAWK	3.10	3.50	3.77		4.73		6.28	5.49	5.94	6.32	7.70	7.19	7.28		91	
YITPI	3.73	4.23	4.39	4.62	3.86	5.20	5.51	5.99	6.57	6.13	5.51	6.50	6.12	90	89	
Site Mean Yield (t/ha)	3.45	4.10	4.57	4.80	4.85	5.63	6.21	6.34	6.72	7.39	7.55	8.05	8.31			

Yield Summary NVT Individual Early Season and Long Season sites 2021:

State	VIC	VIC	VIC	VIC	VIC	VIC	Average
Region	South West	South West	North East	South West	North East	South West	
Locality	Hamilton	Hamilton	Rutherglen	Inverleigh	Numurkah	Streatham	
Trial ID	Long Season	Early Season	Early Season	Early Season	Early Season	Early Season	
Variety Name	% SMY	% SMY	% SMY	% SMY	% SMY	% SMY	t/ha
BigRed	121	117	115	119	106	118	7.57
RGT Accroc	132	110	110	118	109	111	7.49
LRPB Beaufort	109	128	108	111	103	117	7.35
Stockade	114	110	111	103	110	119	7.27
RGT Cesario	121	99	109	109	106	112	7.14
RGT Calabro	105	98	107	112	108	102	6.92
Valiant CL Plus	101	103	103	95	101	109	6.68
RGT Zanzibar	82	94	111	104	111	100	6.67
Severn	82	90	93	99	105	102	6.32
Denison	85	91	103	96	100	88	6.19
Illabo	89	88	95	95	96	99	6.16
LRPB Nighthawk	76	92	101	86	98	95	6.04
LRPB Trojan	78	88	93	102	98	87	6.03
EGA Wedgetail	75	88	97	81	92	88	5.71
Site Mean (t/ha)	4.88	5.41	6.71	7.26	7.42	7.64	6.55
CV (%)	7.31	5.46	5.06	2.23	5.15	4.95	
Probability	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
LSD (t/ha)	0.62	0.53	0.56	0.29	0.62	0.61	
Sowing Date	15-Apr-2021	07-May-2021	02-May-2021	29-Apr-2021	05-May-2021	01-May-2021	
Trial Comments					Irrigated		

Yield Summary Individual FAR Australia Hyper Yielding Wheat trials in the HRZ:

2019 FAR Australia Wheat Yielded Screen Millicent (Sown 18th April)

Genotype	Yield t/ha		Protién %		Screenings %		test Weight kg/hl	
RGT Accroc	10.62	abc	11.3	ijk	0.3	ijk	79.4	ef
Stockade	10.37	bcd	11.5	hij	0.9	b-f	82.2	abc
Annapurna	10.36	bcd	11.8	fgh	0.6	e-i	81.9	abc
Trojan	8.52	i	12.5	d	0.9	b-g	78.4	fg
Scepter	8.25	ijk	12.6	d	0.3	ijk	80.5	de
Grand Mean	9.32		11.89		0.72		79.82	
LSD P=.05	0.47		0.39		0.34		1.11	
Treatment Prob(F)	<0.001		<0.001		<0.001		<0.001	
CV	3.1		2.0		28.9		0.8	

2020 FAR Australia Wheat Yielded Screen Gnarwarre (Sown 26th April)


Genotype	Yield t/ha		Protién %		Screenings %		Test Weight kg/hl	
Annapurna	10.12	b-e	11.6	bc	2.0	a-g	75.7	a-e
Stockade	10.10	b-e	11.2	bc	1.9	c-h	76.8	ab
Catapult	9.62	c-g	12.5	abc	1.4	e-h	75.9	a-d
Scepter	9.20	fgh	12.5	f-i	1.7	c-h	75.8	a-e
Grand Mean	9.35		11.70		1.90		75.30	
LSD P=.05	0.83		2.20		0.80		1.70	
Treatment Prob(F)	<0.001		<0.001		<0.001		<0.001	

2021 FAR Australia Wheat Yielded Screen Millicent (Sown 21st April)


Genotype	Yield t/ha		Protién %		Screenings %		test Weight kg/hl	
Big Red	11.45	abc	11.6	hi	4.7	e	84.2	a
Annapurna	11.30	abc	13.0	cde	4.8	de	82.1	b
RGT Accroc	10.89	cde	11.8	hi	3.0	h	82.1	b
Stockade	9.49	e-h	12.9	c-f	5.5	cd	80.7	bcd
LRPB Beaufort	8.49	ghi	13.4	cd	6.9	b	77.6	fg
LRPB Nighthawk	7.78	ij	13.2	cde	3.0	h	82.2	b
Trojan	6.79	jk	13.1	cde	1.8	i	80.7	bcd
Scepter	5.38	k	14.3	ab	3.3	gh	79.3	def
Grand Mean	10.10		12.80		4.80		80.10	
LSD P=.05	1.46		0.70		0.80		1.80	
Treatment Prob(F)	<0.001		<0.001		<0.001		<0.001	
CV	8.7		3.5		1.4		10.1	

Yield Summary Individual AGF Seeds Wheat variety trials 2021:

2021 AGF Seeds Smeaton Slow Maturity Wheat Trial (Sown 19th April)

Variety	Yield (% SMY)	Stripe			Lodging (0 nil - 5 high)	Grain Loss (0 nil - 5 high)	
		Heading Date	Septoria (% Plot)	Rust (% Plot)			Height (cm)
Stockade	108	18-Oct	20	0	93	0	1
RGT Accroc	107	14-Oct	30	0	97	0	1
RGT Cesario	107	19-Oct	10	0	95	0	1
Big Red	107	16-Oct	5	0	98	0	1
Anapurna	106	15-Oct	15	0	98	0	2
Manning	106	24-Oct	15	0	89	1	1
DS Bennett	97	14-Oct	40	10	112	2	3
Valiant CL Plus	89	1-Oct	50	0	113	3	3
Dennison	81	29-Sep	40	0	102	4	2
Site Mean (t/ha)	12.81	<ul style="list-style-type: none"> • Broadacre Seeds • Pasture Seeds • Forage Crop Seeds • Cover Crop Seeds • Turf Seed 					
CV %	3.27						
P Value	<0.001						
LSD	0.596						
SE	0.296						

2021 AGF Seeds Smeaton Medium Maturity Wheat Trial (Sown 7th May)

Variety	Yield (% SMY)	Stripe			Lodging (0 nil - 5 high)	Grain Loss (0 nil - 5 high)	
		Heading Date	Septoria (% Plot)	Rust (% Plot)			Height (cm)
Stockade	116	23-Oct	5	0	80	0	1
RGT Accroc	112	20-Oct	10	0	82	0	0
Big Red	112	22-Oct	5	0	88	0	1
RGT Cesario	110	24-Oct	5	0	79	0	0
Rockstar	94	7-Oct	15	10	95	2	2
Trojan	88	4-Oct	20	50	88	1	1
Vixen	73	29-Sep	10	5	86	0	4
Site Mean (t/ha)	11.17	<ul style="list-style-type: none"> • Broadacre Seeds • Pasture Seeds • Forage Crop Seeds • Cover Crop Seeds • Turf Seed 					
CV %	9.28						
P Value	<0.001						
LSD	1.47						
SE	0.73						

Quality Characteristic

- White grained wheat with *APW classification* confirmed for all delivery Zones of Australia
- Classification for the Western (WA) and Southern Zone (SA/Vic) have been confirmed on the 2023/24 Master List for this harvest with other regions to be added for the 2024/25 harvest
- Large grain size, low-moderate screenings and good test weight which has coped well at hard finishing despite its Very Slow Spring maturity

Grain Delivery Quality Summary LongReach trials:

Grain quality summary for 5 SA/Vic/NSW LPB Early Season EE trials (2018)

Variety	Test Weight (kg/ha)			Protein (%)			Screenings %			Grain Size (g/1000)		
	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min
DS PASCAL	79.8	83.1	78.4	13.8	16.6	11.4	2.8	4.3	1.5	31.2	33.3	28.7
EGA EAGLEHAWK	80.9	84.7	78.7	13.7	16.5	11.8	4.4	8.4	2.6	30.8	34.0	25.0
LONGSWORD	79.6	82.7	77.4	15.0	18.6	12.5	1.4	3.6	0.5	36.3	42.0	29.0
LRPB NIGHTHAWK	80.3	85.6	77.5	13.2	15.5	11.0	5.0	9.3	2.0	30.9	36.3	22.7
LRPB STEALTH	80.9	83.6	78.7	13.4	16.2	11.5	3.5	5.0	1.8	36.5	38.7	34.0
STOCKADE	81.2	83.7	78.5	13.1	15.8	11.5	3.8	10.7	1.2	37.3	39.0	34.7
LRPB RAIDER	79.5	81.3	76.3	13.8	16.3	11.6	2.9	5.9	1.1	37.5	40.3	32.7
LRPB KITTYHAWK	81.8	84.7	80.2	13.5	15.9	11.4	3.6	7.7	0.5	36.1	39.3	32.0
LRPB TROJAN	81.7	83.6	79.1	13.1	15.2	11.4	2.4	5.1	0.7	40.2	42.0	38.7
WYLAH	81.0	84.0	80.0	15.6	18.4	13.5	3.0	4.9	1.2	35.8	39.3	29.7

Grain quality summary for 3 SA/Vic LPB Early Season EE trials (2019)

Variety	Test Weight (kg/ha)			Protein (%)			Screenings %			Grain Size (g/1000)		
	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min
CUTLASS	85.6	86.1	85.1	11.5	12.0	11.2	1.8	2.3	1.5	36.7	42.3	29.8
DS BENNET	85.8	87.2	84.3	10.6	11.3	10.1	2.0	2.7	1.1	35.8	39.0	31.6
DS PASCAL	85.6	87.4	83.3	11.8	12.9	10.8	1.4	2.8	0.6	34.3	40.7	25.8
LONGSWORD	86.1	86.3	85.9	12.6	13.4	12.0	1.0	1.8	0.6	39.8	43.9	32.3
LRPB STEALTH	86.6	87.9	85.1	11.5	12.3	10.7	1.1	1.9	0.6	38.7	42.4	33.3
STOCKADE	86.7	89.3	83.2	10.9	12.3	10.0	3.7	5.5	1.0	38.0	45.0	27.4
LRPB RAIDER	83.2	84.1	81.6	12.0	12.4	11.7	2.5	4.8	1.3	35.7	41.0	28.9
LRPB BEAUFORT	83.4	85.4	81.2	10.8	11.8	9.9	2.8	4.2	1.5	36.6	40.0	30.9
LRPB KITTYHAWK	87.0	88.8	84.7	11.4	12.4	10.1	1.9	2.6	1.2	38.8	43.0	32.4
LRPB TROJAN	85.8	87.6	84.4	11.5	12.6	10.6	1.5	2.5	0.7	38.6	46.0	29.8
RGT ACCROC	85.0	87.2	82.6	10.7	12.5	9.4	1.2	1.2	1.1	40.1	44.2	32.3
SQP REVENUE	82.2	85.7	78.4	10.7	12.1	9.6	4.2	7.9	1.9	34.4	39.0	28.1
WYLAH	85.5	87.3	84.3	12.6	13.6	11.7	1.8	2.7	0.9	34.1	37.2	29.3
YITPI	85.9	86.5	85.4	11.6	12.0	10.9	2.2	2.7	1.6	36.7	38.9	33.0

Grain quality summary for 2 SA/Vic LPB Early Season EE trials (2021)

Variety	Test Weight (kg/ha)			Protein (%)			Screenings %			Grain Size (g/1000)		
	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min
BECKOM	86.1	86.6	85.5	12.0	12.5	11.4	0.5	0.6	0.4	40.4	43.5	37.3
BOLAC	85.8	86.0	85.5	12.1	14.0	10.2	0.8	0.9	0.7	36.6	38.0	35.1
CATAPULT	87.1	87.5	86.7	11.6	13.0	10.2	0.4	0.5	0.2	49.5	51.4	47.5
DENISON	86.6	86.9	86.3	11.1	13.0	9.2	0.7	1.0	0.4	47.8	48.7	46.9
ILLABO	85.1	85.5	84.7	12.7	12.7	12.7	0.5	0.6	0.3	46.6	48.4	44.7
STOCKADE	88.1	88.6	87.6	10.3	11.0	9.6	1.2	2.0	0.3	47.7	48.0	47.4
LRPB BALE	87.9	88.7	87.0	12.6	13.1	12.0	0.7	0.7	0.6	42.2	45.8	38.6
LRPB DUAL	86.6	87.2	86.0	15.1	15.6	14.5	0.7	0.8	0.5	50.1	55.8	44.3
LRPB RAIDER	85.7	86.8	84.5	12.0	13.1	10.8	0.7	1.2	0.2	46.8	50.6	42.9
LRPB TROJAN	87.3	87.3	87.3	13.7	13.9	13.4	0.3	0.3	0.2	50.9	52.8	48.9
YITPI	86.6	88.2	84.9	12.9	13.8	12.0	1.1	1.6	0.5	48.5	53.2	43.7

Grain Delivery Quality Summary NVT trials:

Grain quality summary for 5 SA/Vic NVT Early/Long Season trials (2021)

Variety	Test Weight (kg/ha)			Protein (%)			Screenings %			Grain Size (g/1000)		
	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min	Ave	Max	Min
BigRed	80.2	83.3	78.6	10.5	12.5	9.2	1.4	2.3	0.6	50.1	54.0	40.9
Denison	77.8	81.6	70.4	12.3	12.8	11.8	1.1	2.3	0.6	47.4	50.7	43.3
EGA Wedgetail	75.4	78.8	72.5	12.9	13.3	12.5	1.1	2.0	0.6	41.7	44.7	37.0
Illabo	77.2	80.0	75.8	12.7	13.6	11.9	1.0	1.9	0.2	44.4	47.6	39.4
Stockade	78.7	83.3	69.8	10.4	11.4	9.5	1.9	2.6	1.2	44.7	48.3	39.3
LRPB Beaufort	77.4	80.9	75.4	11.5	12.6	10.3	1.8	2.3	1.4	44.3	47.5	40.9
LRPB Nighthawk	77.3	82.4	69.3	12.6	13.9	11.9	1.0	1.3	0.7	43.3	45.7	40.0
LRPB Trojan	75.3	81.9	68.6	12.7	13.9	11.6	1.3	2.6	0.7	47.5	51.5	42.5
RGT Accroc	75.8	81.6	63.8	10.3	11.4	9.1	1.4	2.5	0.9	47.6	50.4	42.2
RGT Calabro	76.1	82.0	68.7	10.4	11.8	9.4	2.0	2.8	1.2	47.7	52.0	41.7
RGT Cesario	75.3	80.7	65.0	10.8	11.7	9.7	1.5	2.1	0.7	42.1	44.2	39.0
RGT Zanzibar	78.9	81.9	76.8	11.9	12.5	11.4	2.7	3.8	1.8	54.0	57.2	49.8
Severn	78.7	81.4	74.9	12.9	13.5	12.2	2.2	3.1	1.7	50.0	54.4	42.4
Valiant CL Plus	80.0	82.9	73.6	12.7	13.4	12.0	0.6	1.2	0.4	49.1	50.7	47.3

Summary includes all genotypes that were included in all sites in SE SA, SW Vic and NE Vic in both Early Season and Long Season trials

Stockade plant type mid to late vegetative growth:



Stockade plant type early grain fill:



Catapult (7.56 t/ha) LHS vs LPB16-0598 (8.84 t/ha), Conmurra SA, 2020

Stockade plant type late grain fill:



Yitpi (6.50 t/ha) LHS vs Stockade (8.84 t/ha) RHS, Conmurra SA, 2020



Stockade ⁽¹⁾ Spring Wheat

White, milling grade, Awned, Very-Slow

<p>MATURITY SPEED</p>  <p>VERY QUICK VERY SLOW</p>	<p>SCEPTORIA RESISTANCE</p> <p>MS</p>	<p>LEAF RUST RESISTANCE</p> <p>MR_p</p>	<p>STEM RUST RESISTANCE</p> <p>MS</p>	<p>STRIPE RUST RESISTANCE</p> <p>MR</p>
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