



Hyper Yielding Crops Project

Provisional 2020 Canola Results



Hyper Yielding Cereal Canola Site – Wallendbeen 2020



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Interpretation Notes

Winter – winter canola

Spring – spring canola

Figures followed by the same letter are not considered to be statistically different ($p=0.05$).

Plot yields: To compensate for edge effect a full row width (22.5cm) has been added to either side of the plot area (equal to plot centre to plot centre measurement in this case). All provisional results have been analysed through ARM software with further spatial analysis from SAGI when the final results are released.

2020 NSW Crop Technology Centre - Wallendbeen, New South Wales

Sown: 17 April 2020

Harvested: 28 November and 12 December 2020

2019 Crop: Wheat.

Soil type & management: Red loam

Available Nitrogen (kg/ha) 0-60 cm: 140 kg/ha

Colwell P (mg/kg) 0-10 cm: 38

pH (CaCl₂) 0-10 cm: 5.6

Organic Carbon (%) 0-10 cm: 1.7

Trial 1. HYC Winter canola screen

Objectives: To examine the suitability of elite commercial and unreleased winter canola cultivars for Hyper-yielding regions

Key points:

- There is a gradual shift earlier in flowering date with new cultivars, with the recently released Phoenix CL, SF Nizza CL and now Hyola Feast CL (CL82005) all being at least five days faster to flower than the industry benchmark Hyola 970CL.
- The fastest winter was still however 19 days slower to flower than the slowest spring cultivar, highlighting the need for local breeding to fill this space.
- CL82005 (now Hyola Feast CL) was the highest yielding variety and had the highest oil concentration. It will form a major part of HYC canola trial programs in coming seasons.
- The mean yield of the winter screen of 4.04 t/ha was 0.74 t/ha below the mean yield of the spring screen. The flowering date of the winter cultivars was later than ideal for the region, whereas the spring cultivars can flower close to the optimum flowering date (late August-early September).

Treatments: 12 cultivars (currently there are 3 commercial cultivars) sown in small plots (half of normal plot length) with 'High input' treatment as per Trial 3.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

Variety	Phenology	Yield		Grain Quality			
	Flowering Date	Yield		Oil		TSW	
		(t/ha)		%		grams	
Hyola 970CL	2 October	4.56	ab	47.1	bcd	3.78	c-g
Edimax CL	29 September	3.65	d	46.7	de	4.05	ab
SF Nizza CL	26 September	3.90	cd	47.9	a	4.17	a
Phoenix CL	27 September	4.25	a-d	48.0	a	3.59	hi
CL82003	1 October	4.24	a-d	47.4	abc	3.91	bcd
CL82004	2 October	3.99	bcd	47.6	ab	3.95	bc
CL82005	26 September	4.68	a	47.9	a	3.55	i
CL210003	4 October	3.90	cd	46.9	cde	3.91	bcd
CL210004	4 October	3.68	cd	46.4	ef	3.95	bc
SF65-056-CL	28 September	3.64	d	46.0	fg	3.50	i
CL210007	4 October	3.78	cd	46.8	cde	3.78	c-g
CC210008	6 October	4.05	bcd	44.7	h	3.92	bcd
CC210009	5 October	4.27	abc	45.6	g	3.91	cde

Mean	4.04	46.9	3.8
LSD 0.05	0.60	0.7	0.18
P Val	0.021	<0.001	<0.001

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:	17 April	
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		130 kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	17 April	150 kg/ha SOA (30 kg/ha N)
	11 June	196 kg/ha Urea (90 kg/ha N)
	4 August	70 kg/ha Urea (32 kg/ha N)
Fungicide:	30 May	Prosaro 450ml/ha
	30 September	Aviator Xpro 800 mL/ha

Trial 2. HYC Spring canola screen

Objectives: To examine the suitability of elite commercial and unreleased spring cultivars for Hyper-yielding regions

Key points:

- Diamond was the fastest cultivar to flowering, nine days faster than ADV Galaxy and 38 days faster than the slowest cultivar ADV Magnificent.
- The optimum flowering date for this environment is late August/early September, which suited high yielding mid-season cultivars such as Nuseed Quartz, HyTTec Trifecta, 45Y93 CL, 45Y28 RR, NCH18Q551 and AN20RR002.
- The highest yield was from the unreleased Nuseed cultivar NCH18Q551 with 5.61 t/ha, 0.93 t/ha higher yielding than the highest winter variety.
- The average yield of each herbicide tolerance group was:
 - Conventional – 4.70 t/ha
 - Triazine tolerant (including CLF + TT) – 4.46 t/ha
 - Clearfield (including Truflex + Clearfield) – 4.60 t/ha
 - RR/Truflex – 5.20 t/ha.
- This highlights the very-high yield potential of the RR/Truflex group and suitability for HYC environments. NCH18Q551 also had the highest oil concentration, the only cultivar >50%.
- The overall oil yield of the highest yielding treatment NCH18Q551 was 2.82 t/ha, 34% more than the lowest yielding cultivar, Nuseed Diamond. This highlights the importance of cultivar choice for Hyperyielding environments.

Treatments: 24 cultivars sown in small plots (half of normal plot length) with ‘High input’ management as per Trial 3.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

Variety	Phenology	Yield		Grain Quality			
	Flowering Date	Yield (t/ha)		Oil (%)	TSW (grams)		
Nuseed Diamond (Conv.)	31 July	4.08	h	45.7	ijk	4.27	cde
Nuseed Quartz (Conv.)	27 August	5.32	ab	48.6	bcd	4.20	ef
SF Ignite (TT)	2 September	4.36	e-h	46.1	hij	4.04	fgh
HyTTec Trifecta (TT)	28 August	5.03	bc	48.4	bcd	4.07	e-h
HyTTec Trophy (TT)	19 August	4.51	d-g	48.0	b-f	3.55	j
ATR Wahoo (TT)	5 September	4.30	gh	47.4	c-h	4.41	bcd
CHYB3668TT (TT)	4 September	4.66	c-g	46.6	e-j	3.90	hi
ADV Remarkable (TT)	16 August	4.68	c-g	47.0	d-i	4.54	ab
ADV Magnificent (TT)	7 September	4.46	d-h	49.0	ab	4.10	efg
ADV Spectacular (TT)	4 September	4.65	c-g	47.3	c-i	4.23	c-f
ADV Exhilarate (CLF + TT)	18 August	4.52	d-g	47.8	b-g	4.53	ab
45Y93 CL (CLF)	30 August	5.30	ab	48.2	b-e	3.94	ghi
ADV Equinox (CLF)	24 August	4.80	cd	47.8	b-g	4.68	a
ADV Galaxy (CLF)	9 August	4.73	cde	48.0	b-f	4.68	a
45Y91 CL (CLF)	1 September	4.51	d-g	48.0	b-f	3.87	hi
SF65-050CL (CLF)	27 August	4.43	d-h	46.1	g-j	4.27	cde
43Y92 CL (CLF)	17 August	4.58	d-g	44.4	k	4.21	def
45Y28 (RR)	30 August	5.47	a	46.9	d-i	3.94	ghi
45Y25 RR (RR)	31 August	5.01	bc	48.2	b-e	4.42	bc
NCH18Q421 (Truflex)	24 August	5.38	ab	48.9	abc	4.22	c-f

NCH18Q551 (Truflex)	3 September	5.61	a	50.3	a	4.24	c-f
Hyola 540XC (Truflex + CLF)	20 August	4.33	fgh	46.4	f-j	4.04	fgh
InVigor R5520P (RR)	22 August	4.70	c-f	47.5	b-h	3.48	j
AN20RR002 (Truflex)	2 September	5.30	ab	48.0	b-f	3.78	i
Mean		4.78		47.4		4.15	
LSD 0.05		0.39		1.65		0.20	
P Val		<0.001		<0.001		<0.001	

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:	17 April	
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		130 kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	17 April	150 kg/ha SOA (30 kg/ha N)
	11 June	196 kg/ha Urea (90 kg/ha N)
	4 August	70 kg/ha Urea (32 kg/ha N)
Fungicide:	30 May	Prosaro 450ml/ha
	26 August	Aviator Xpro 800 mL/ha
	24 September	Prosaro 450 mL/ha

Trial 3. HYC G.E.M Trial series

Objectives: To determine the response to increased crop inputs (fungicide and nitrogen) of a range of canola variety types.

Key points:

- Selecting the best varieties is important to achieve Hyperyielding canola:
 - HyTTec Trifecta (TT), 45Y28 RR and Xseed Condor (Truflex) were the highest yielding cultivars at both High and Low input.
- Extra inputs can increase yield potential in Hyperyielding canola:
 - High input management (extra fungicide and nitrogen) increased grain yield (compared to Low Input) by an average of 0.74 t/ha.
- The best cultivars also had the strongest response to increasing inputs:
 - The three highest yielding cultivars, HyTTec Trifecta, 45Y28 RR and Xseed Condor, increased yield by >0.9 t/ha with High Input management, compared with an average yield increase of 0.6 t/ha for the other six varieties.
 - The increase in yield was mostly due to extra nitrogen in the High Input treatment.
- Increasing inputs (nitrogen and fungicide) increased final (maturity) biomass and increased harvest index.
- High yielding varieties can also have high oil concentration:
 - Xseed Condor and HyTTec Trifecta had the highest oil concentration, increasing their potential gross income.

Treatments: Two management levels (combination of nitrogen and fungicide) applied to 9 canola varieties.

Table 1. Influence of management strategy and variety on grain yield (t/ha).

Cultivar	Phenology Flowering Date	Management Level			
		Low input Yield t/ha	High input Yield t/ha	Mean Yield t/ha	
Hyola 970CL (Winter)	2 October	3.35 g	3.88 cd	3.61	c
SF Nizza CL (Winter)	26 September	3.04 h	3.60 ef	3.32	d
SF Edimax CL (Winter)	29 September	2.79 i	3.41 fg	3.10	e
ATR Wahoo TT (Spring)	5 September	3.40 fg	4.00 c	3.70	c
HyTTec Trifecta (Spring)	28 September	4.03 c	4.96 a	4.49	a
SF Ignite TT (Spring)	2 September	3.66 de	4.37 b	4.01	b
45Y28 RR (Spring)	30 August	3.92 c	4.92 a	4.42	a
Xseed Condor (Spring)	24 August	3.94 c	4.84 a	4.39	a
Nuseed Diamond (Spring)	31 July	3.52 efg	4.28 b	3.90	b
Mean		3.51	4.25	3.88	
LSD Cultivar p = 0.05		0.19	P val	<0.001	
LSD Management p=0.05		0.07	P val	<0.001	
LSD Cultivar x Man. P=0.05		0.23	P val	0.019	

Winter – winter canola, Spring – spring canola.

A single application of Prosaro at 20% Bloom was enough to control most of the disease infection in this trial. Most of the yield improvement from the High Input management can be attributed to the higher rate of N (extra 60 kg/ha) applied. Nitrogen increased the final biomass by an average of 2.5

t/ha and increased harvest index by 0.023. This response to N is important for growers and agronomists managing crops for Hyperyields, that harvest index does not decline as biomass increases.

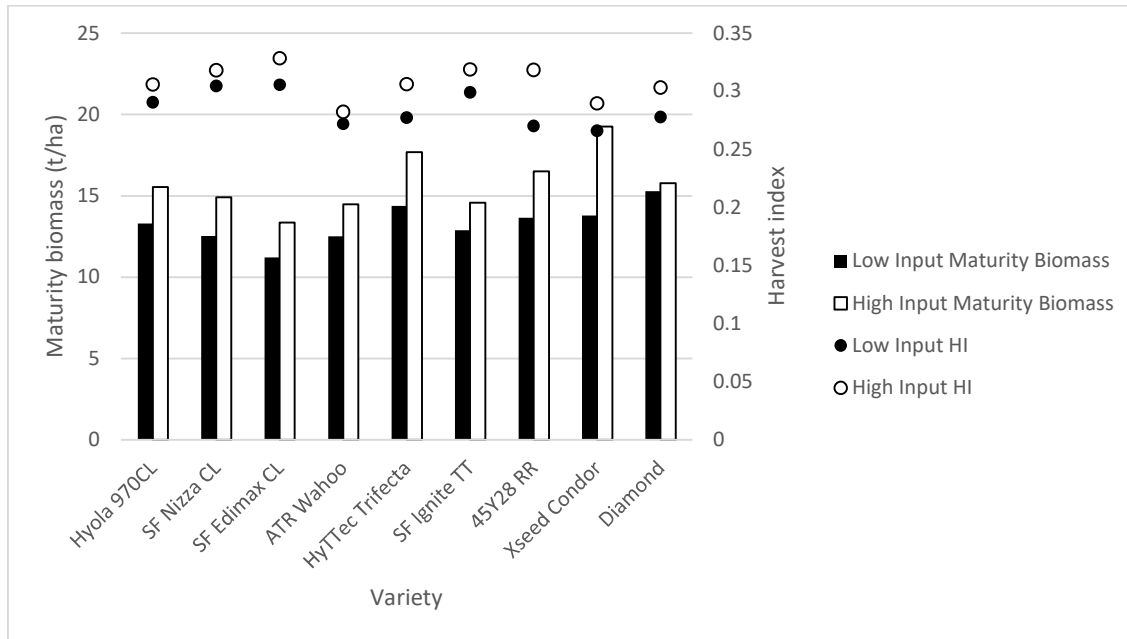


Figure 1: Effect of management strategy and variety choice on maturity biomass and harvest index.

LSD Maturity biomass = 1.56 t/ha

LSD HI = 0.016

Table 2. Influence of management strategy and variety on oil concentration (%).

Cultivar	Management Level			
	Low input	High input	Mean	
	Oil %	Oil %	Oil %	
Hyola 970CL (Winter)	47.7	47.4	47.6	c
SF Nizza CL (Winter)	49.0	48.6	48.8	b
SF Edimax CL (Winter)	47.8	47.8	47.8	c
ATR Wahoo TT (Spring)	48.4	47.8	48.1	c
HyTTec Trifecta (Spring)	49.9	49.1	49.5	a
SF Ignite TT (Spring)	46.9	46.5	46.7	d
45Y28 RR (Spring)	48.6	47.4	48.0	c
Xseed Condor (Spring)	50.2	49.2	49.7	a
Nuseed Diamond (Spring)	48.8	47.4	48.1	c
Mean	48.6	47.9	48.3	
LSD Cultivar p = 0.05	0.63	P val	<0.001	
LSD Management p=0.05	0.30	P val	<0.001	
LSD Cultivar x Man. P=0.05	ns	P val	0.318	

Table 3. Details of the management levels.

Sowing date:	17 April		
Plant population:		60 plants/m ²	

Seed Treatment:		Jockey + Poncho	
Basal Fertiliser:		130 kg/ha MAP (15 kg/ha N)	
		150 kg/ha SOA (30 kg/ha N)	
		Low input	High input
Nitrogen:	6-leaf	30 kg/ha	30 kg/ha
	Bud visible		30 kg/ha
	Start Flower		30 kg/ha
Total N Applied:		75 kg/ha	135 kg/ha
Fungicide:	30 May	Prosaro 0.45 L/ha	
	20% Bloom	Prosaro 0.45 L/ha	Aviator Xpro 0.8 L/ha
	50% Bloom		Prosaro 0.45 L/ha

Trial 4. Plant density for hyper-yielding

Objectives: To determine optimum plant density for hyper-yielding canola

Key points:

- Canola is an extremely plastic crop:
 - There was no overall effect of seeding rate (from 15 to 70 plants/m²) on grain yield, oil concentration or harvested seed size (thousand seed weight).
- 45Y28 (RR) was higher yielding than HyTTec Trifecta at all seeding rates.

Treatments: Two varieties, one TT and one non-TT, sown at four seeding rates to target 15, 30, 50 and 75 plants/m².

Table 1. Grain yield (t/ha), % site mean, protein (%), test weight (kg/hl) and screenings (%).

Target Seed Rate (m ²)	Variety	Grain Yield		Grain Quality	
		Yield (t/ha)		Oil %	TSW grams
15	45Y28 (RR)	4.96	-	47.6	- 3.82
15	HyTTec Trifecta	4.69	-	48.3	- 4.00
	Mean	4.83	-	48.0	- 3.91
30	45Y28 (RR)	5.05	-	47.9	- 3.82
30	HyTTec Trifecta	4.79	-	48.4	- 4.07
	Mean	4.92	-	48.1	- 3.95
50	45Y28 (RR)	5.04	-	47.7	- 3.86
50	HyTTec Trifecta	4.67	-	48.6	- 4.10
	Mean	4.85	-	48.2	- 3.98
75	45Y28 (RR)	4.92	-	47.6	- 3.93
75	HyTTec Trifecta	4.62	-	48.4	- 4.14
	Mean	4.77	-	48.0	- 4.03
	Grand Mean	4.84		48.1	3.97
LSD seed rate (p = 0.05)		ns		ns	ns
LSD Variety		0.24		0.28	0.08
LSD Var x seed rate		ns		ns	ns
P Val seed rate		0.403		0.682	0.151
P Val Variety		<0.001		<0.001	<0.001
P Val Var x seed rate		0.921		0.809	0.886

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		17 April
Sowing Fertiliser:		130 kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:		
	17 April	150 kg/ha SOA (30 kg/ha N)
	11 June	196 kg/ha Urea (90 kg/ha N)
	4 August	70 kg/ha Urea (32 kg/ha N)
Fungicide:		
	30 May	Prosaro 450ml/ha
	26 August	Aviator Xpro 800 mL/ha
	24 September	Prosaro 450 mL/ha

Trial 5. Nitrogen nutrition for hyper-yielding canola

Objectives: To determine optimum nitrogen nutrient management (including rate and timing) for hyper-yielding canola.

Key points:

- Nitrogen fertility (from the soil and from fertiliser) is crucial for growing Hyperyielding canola:
 - The highest N rate was the highest yielding treatment at 5.44 t/ha.
 - The overall fertility of the paddock was strong, with a yield of 4.14 t/ha where only the base level 45 kg/ha N (130 kg/ha MAP and 150 kg/ha SOA) was applied.
- The oil penalty from extra N application may not be as pronounced in Hyperyielding environments:
 - Canola oil concentration typically declines (in low-medium rainfall environments) with increased nitrogen application. This was not the case in this trial with N rates from 45 to 225 kg/ha.

Treatments: Nine nutrition rate and timing treatments applied to 45Y28 RR.

Table 1. Detailed treatment list, yield (t/ha) & % Site Mean.

Trt.	Treatments	Nitrogen						Yield (t/ha)
		Kg N/ha						
		Sowing	6L	BV	SF	MF	Total	
1	Nil	45	---	---	---	---	45	4.14 g
2	33.3%	45	30	---	---	---	75	4.46 f
3	200%	45 + 90	30	30	30	---	225	5.44 a
4	100% Upfront	45 + 90	---	---	---	---	135	4.84 e
5	100% Split	45	30	30	30	---	135	5.04 cd
6	100% Bud visible	45	---	90	---	---	135	5.13 b
7	100% Start flower	45	---	---	90	---	135	5.07 bc
8	100% Split late foliar	45	30	30	15*	15*	135	4.97 d
9	100% Split + Manure	45	30	30	30	---	135	5.00 cd
Mean							4.90	
LSD (p=0.05)							0.08	
P Val							<0.001	

6L = 6 leaf BV = Bud visible, SF = Start of flowering, MF = mid-flowering

MAP was applied at a rate of 100kg/ha and all treatments received 30kg/ha of SOA at sowing.

*Late foliar treatments (treatment 8) applied as liquid urea through flat fan nozzles.

There was no effect of nitrogen treatment on oil concentration (average 47.8) or seed size (thousand seed weight = 3.93 grams average). Of the other yield components, the increased yield could be explained by the increase in pods/m², from 6227 with nil N to 9069 for the 200% treatment. There was no effect of N treatment on seeds/pod (average = 16.8).

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:		As per treatment list
Fungicide:	17 June	Prosaro 450ml/ha
	10 September	Prosaro 450ml/ha

Trial 6. Disease management for hyper-yielding canola

Objectives: To determine optimum foliar fungicide management for hyper-yielding canola.

Individual objectives specific to the trial are:

1. Determine the value of contrasting major gene blackleg resistance groups in HYC environments:
 - a. BC (45Y28 RR and 45Y93 CL) – largely ineffective major gene resistance (good minor gene resistance).
 - b. ABD (HyTTec Trifecta) – currently effective major gene resistance.
2. Determine the effect of fungicide management strategies on disease control (upper canopy blackleg and sclerotinia), grain yield and profitability.

Key points:

- The Roundup Ready cultivar 45Y28 RR was consistently higher yielding than the TT cultivar HyTTec Trifecta.
- Hyperyielding Crops don't always need a lot of fungicide:
 - A two-spray strategy of Miravis Star at 20% Bloom followed by Prosaro at 50% Bloom yielded 0.3 t/ha more than the untreated control. At a cost >\$100/ha, the profitability of this fungicide program would have been approximately break-even.
- Resistant cultivars are useful to reduce disease infection, in this case for Upper Canopy Blackleg:
 - In this trial however the yield potential of 45Y28 RR outweighed the resistance benefit of HyTTec Trifecta which has major gene resistance still effective.

Treatments: Six Fungicide strategies applied to two varieties

Table 1. Influence of management strategy and variety of wheat grain yield (t/ha).

Treatment I.D.	Treatment			45Y28 RR		HyTTec Trifecta	Mean	
	4-Leaf	20% Bloom	50% Bloom	Yield (t/ha)		Yield (t/ha)	Yield (t/ha)	
1	Prosaro 300ml/ha	---	---	4.77	-	4.60	4.68	c
2	Prosaro 300ml/ha	Prosaro 450ml/ha	---	4.99	-	4.68	4.83	b
3	Prosaro 300ml/ha	Prosaro 450ml/ha	Prosaro 450ml/ha	5.07	-	4.68	4.87	b
4	Prosaro 300ml/ha	Aviator 800ml/ha	Prosaro 450ml/ha	5.09	-	4.79	4.94	ab
5	Prosaro 300ml/ha	Miravis Star 1000ml/ha	Prosaro 450ml/ha	5.14	-	4.84	4.99	a
6	Prosaro 300ml/ha	Revystar 1000ml/ha	Prosaro 450ml/ha	5.03	-	4.76	4.89	ab
			Mean	5.01		4.72	4.87	
	LSD Variety P=0.05			0.07		P val	<0.001	
	LSD Fungicide P=0.05			0.12		P val	<0.001	
	LSD Variety x Fungicide P=0.05			n.s.		P val	0.663	

There was no effect of fungicide on oil concentration, but HyTTec Trifecta (48.1%) had slightly higher oil concentration overall compared with 45Y28 RR (47.6%).

Increasing fungicide input from nil fungicide, to one Prosaro at 20% Bloom to two fungicides, one at 20% Bloom and one at 50% Bloom, reduced the symptoms of the diseases Sclerotinia stem rot, Upper canopy blackleg (branch infection) and Powdery Mildew but none of the disease were present at levels that caused severe yield loss. Upper canopy blackleg infection was higher in 45Y28 RR than in HyTTec Trifecta. Fungicide provided close to full control in HyTTec Trifecta but there was still some disease in 45Y28 RR even with a two-spray fungicide program. Despite this yield was still highest in 45Y28 RR and the response to the highest yielding fungicide treatment was only 0.3 t/ha above the nil fungicide treatment. For Powdery Mildew, HyTTec Trifecta consistently had higher infection levels than 45Y28 RR but the magnitude of the yield loss was much smaller than the magnitude in reduction in Powdery Mildew symptoms from fungicide application.

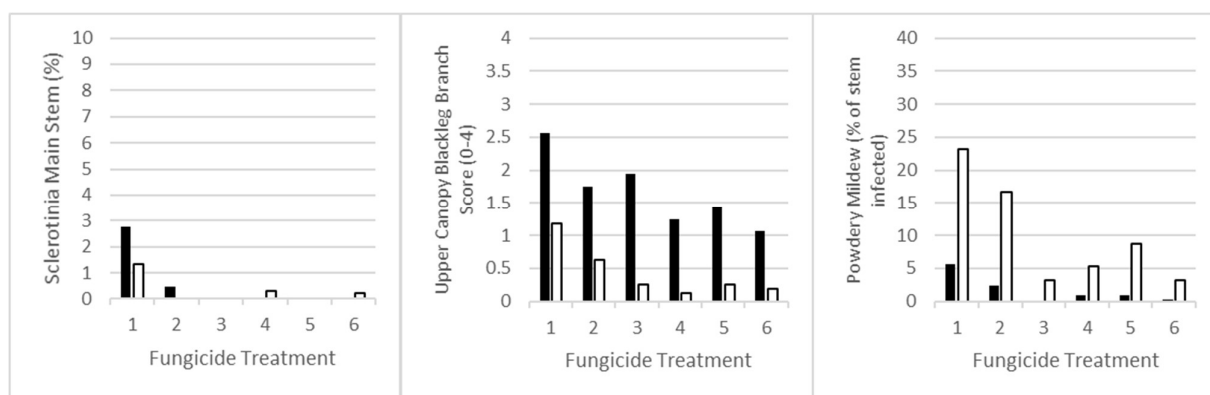


Figure 1. Effect of fungicide treatment on a) Sclerotinia stem rot infection (percentage of main stems infected, b) Upper canopy blackleg branch infection, where 0 = nil infection, 2 = infection common but with minimal branch death, 4 = infection common with a high rate of branch senescence; c) Powdery mildew infection (percentage of branch/stem area infected). Black bars = 45Y28 RR and white bars = HyTTec Trifecta. L.S.D. Sclerotinia = 0.79%, Upper Canopy Blackleg = 0.66 and Powdery Mildew = 5.8%.

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		17 April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		130kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	17 April	150 kg/ha SOA (30 kg/ha N)
	11 June	196 kg/ha Urea (90 kg/ha N)
	4 August	70 kg/ha Urea (32 kg/ha N)
Fungicide:		As per treatment list

2020 VIC Crop Technology Centre - Gnarwarre, Victoria

Sown: 28 April 2020

Harvested: 4 & 29 December 2020

2019 Crop: Barley.

Soil type & management: Grey clay loam

Available Nitrogen (kg/ha) 0-60 cm: 78.2

Colwell P (mg/kg) 0-10 cm: 140.0

pH (CaCl₂) 0-10 cm: 5.2

Organic Carbon (%) 0-10 cm: 2.4

Trial 1. HYC Winter canola screen

Objectives: To examine the suitability of elite commercial and unreleased winter canola cultivars for Hyper-yielding regions

Key points:

- CL82005, now released as Hyola Feast CL was the highest yielding cultivar, with a yield of 3.99 t/ha.
- Hyola Feast CL was > 0.6 t/ha higher yielding than the two other most popular winter canola cultivars in the trial, Edimax CL and Hyola 970CL.
- There were subtle differences between the oil concentration cultivars, but not to the magnitude of the differences in grain yield.

Treatments: 12 cultivars (currently there are 3 commercial cultivars) sown in small plots (half of normal plot length) with 'High input' treatment as per Trial 3.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

Variety	Yield				Grain Quality			
	Yield		Site Mean		Oil		Test wt	
	(t/ha)		(%)		%		kg/HL	
Hyola 970CL	3.34	b-e	101.8	b-e	45.8	abc	66.7	cd
Edimax CL	3.27	b-f	99.6	b-f	45.0	abc	67.4	ab
SF Nizza CL	3.34	b-e	101.8	b-e	46.5	a	65.3	e
CL82003	3.69	abc	112.3	abc	45.3	abc	67.1	bcd
CL82004	2.91	ef	88.6	ef	45.5	abc	68.0	a
CL82005	3.99	a	121.5	a	44.4	cd	65.4	e
CL210003	3.01	def	91.7	def	45.1	abc	67.7	ab
CL210004	2.70	f	82.2	f	45.7	abc	67.8	ab
SF65-056-CL	3.13	c-f	95.4	c-f	45.5	abc	68.2	a
CL210007	2.92	ef	89.0	ef	45.5	abc	67.5	ab
CC210008	3.00	def	91.5	def	45.4	abc	67.4	abc
CC210009	3.52	a-d	107.4	a-d	44.7	bcd	67.2	bcd
Mean	3.28		100.0		45.4		66.9	
LSD 0.05	0.59		18.1		1.5		0.8	
P Val	0.004		0.004		0.039		<0.001	

Table 2. Phenology evaluation, growth stage (0-99) recorded at key points in the season.

	01-Jul	08-Aug	10-Sep	14-Oct	29-Oct
Hyola 970CL	15.0	19.0	31.0	62.0	67.0
Edimax CL	15.0	19.0	51.0	65.0	69.0
SF Nizza CL	15.0	19.0	36.0	64.0	67.0
CL82003	15.0	19.0	36.0	65.0	67.0
CL82004	15.0	19.0	32.0	62.0	67.0
CL82005	15.0	19.0	36.0	64.0	67.0
CL210003	15.0	19.0	51.0	65.0	69.0
CL210004	15.0	19.0	51.0	67.0	71.0
SF65-056-CL	15.0	19.0	31.0	64.0	69.0
CL210007	15.0	19.0	51.0	67.0	67.0
CC210008	15.0	19.0	51.0	65.0	71.0
CC210009	15.0	19.0	51.0	67.0	71.0

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	7 July	65 N kg/ha
	21 September	104 N kg/ha
Fungicide:	17 June	Prosaro 450ml/ha
	10 September	Prosaro 450ml/ha

Trial 2. HYC Spring canola screen

Objectives: To examine the suitability of elite commercial and unreleased spring cultivars for Hyper-yielding regions

Key points:

- Diamond was clearly the fastest cultivar but there were several grouped together at the slower end including the commercial cultivars SF Ignite TT, ATR Wahoo and 45Y25 RR.
- Four cultivars, including ADV Equinox, ADV Galaxy, NCH18Q421 (now Xseed Condor) and AN20RR002 achieved grain yield > 4 t/ha, compared with none in the winter screen trial.

Treatments: 24 cultivars sown in small plots (half of normal plot length) with 'High input' management as per Trial 3.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

Variety	Yield				Grain Quality					
	Yield (t/ha)		Site Mean (%)		Oil (%)		Test wt (kg/HL)		Protein (%)	
Nuseed Diamond (Conventional)	3.32	a-e	99.0	a-e	42.8	b-f	64.6	b-f	18.8	c-h
Nuseed Quartz (Conventional)	3.51	a-d	104.9	a-d	44.1	a-d	64.6	b-f	18.0	f-i
SF Ignite (TT)	3.33	a-e	99.4	a-e	44.2	abc	64.4	b-f	18.9	b-h
HyTTec Trifecta (TT)	2.75	de	82.1	de	39.1	i	65.6	a-d	20.7	ab
HyTTec Trophy (TT)	3.56	a-d	106.3	a-d	42.6	b-f	65.5	a-e	16.6	ij
ATR Wahoo (TT)	3.76	a-d	112.2	a-d	44.7	ab	63.5	f	20.1	a-d
CHYB3668TT (TT)	2.16	e	64.6	e	40.5	f-i	63.7	def	19.5	a-g
ADV Exhilarate (TT)	2.90	de	86.6	de	40.0	ghi	66.6	a	19.6	a-g
ADV Remarkable (TT)	3.13	b-e	93.5	b-e	43.2	b-e	65.6	a-d	21.1	a
ADV Magnificent (TT)	3.10	b-e	92.6	b-e	44.0	a-d	65.7	abc	20.3	abc
ADV Sensational (TT)	2.99	cde	89.3	cde	41.6	d-i	65.6	a-e	20.1	a-d
45Y93 CL (CLF)	2.81	de	84.0	de	39.7	hi	64.0	c-f	17.6	hij
ADV Equinox (CLF)	4.25	ab	126.9	ab	44.2	abc	65.0	a-f	19.2	a-h
ADV Galaxy (CLF)	4.12	abc	123.0	abc	43.4	b-e	64.8	a-f	19.3	a-h
SF65-050CL (Clearfield)	3.46	a-d	103.3	a-d	44.3	abc	65.1	a-f	20.0	a-e
45Y28 (RR)	3.60	a-d	107.6	a-d	41.8	c-h	63.5	f	19.4	a-h
NCH18Q421 (Truflex)	4.17	abc	124.6	abc	43.6	a-d	64.7	a-f	19.6	a-g
NCH18Q551 (Truflex)	3.52	a-d	105.2	a-d	44.6	ab	64.8	a-f	17.7	ghi
Hyola 540XC (Truflex + CLF)	3.57	a-d	106.7	a-d	46.0	a	64.2	b-f	18.8	c-h
InVigor R5520P (Roundup Ready)	2.21	e	66.0	e	41.1	e-i	65.0	a-f	18.1	e-i
AN20RR002 (Truflex)	4.36	a	130.2	a	42.9	b-f	65.5	a-e	18.7	j
45Y91 CL	3.12	b-e	93.3	b-e	44.6	ab	64.0	c-f	19.7	a-f
45Y25 RR	3.82	a-d	114.0	a-d	42.4	b-g	65.9	ab	18.3	d-i
Mean	3.35		100.0		42.8		64.8		19.0	
LSD 0.05	1.19		35.4		2.6		1.9		1.9	
P Val	0.026		0.026		<0.001		0.093		<0.001	

Table 2. Phenology evaluation, growth stage (0-99) recorded at key points in the season.

	29-Jul	11-Aug	10-Sep
Nuseed Diamond (Conventional)	61.0	63.0	75.0
Nuseed Quartz (Conventional)	53.0	59.0	65.0
SF Ignite (TT)	51.0	59.0	63.0
HyTTec Trifecta (TT)	51.0	60.0	65.0
HyTTec Trophy (TT)	51.0	58.0	65.0
ATR Wahoo (TT)	51.0	60.0	63.0
CHYB3668TT (TT)	50.0	60.0	66.0
ADV Exhilarate (TT)	51.0	60.0	63.0
ADV Remarkable (TT)	53.0	58.0	65.0
ADV Magnificent (TT)	50.0	55.0	63.0
ADV Sensational (TT)	51.0	59.0	63.0
45Y93 CL (CLF)	51.0	50.0	66.0
ADV Equinox (CLF)	51.0	58.0	65.0
ADV Galaxy (CLF)	53.0	59.0	65.0
SF65-050CL (Clearfield)	53.0	61.0	66.0
45Y28 (RR)	53.0	60.0	65.0
NCH18Q421 (Truflex)	53.0	61.0	65.0
NCH18Q551 (Truflex)	51.0	58.0	65.0
Hyola 540XC (Truflex + CLF)	51.0	58.0	65.0
ATR Wahoo (SUB)	50.0	55.0	63.0
InVigor R5520P (Roundup Ready)	51.0	59.0	65.0
AN20RR002 (Truflex)	53.0	59.0	65.0
45Y91 CL	51.0	60.0	65.0
45Y25 RR	51.0	58.0	63.0

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	7 July	65 N kg/ha
	29 July	104 N kg/ha
Fungicide:	17 June	Prosaro 450ml/ha
	10 September	Prosaro 450ml/ha

Trial 3. HYC G.E.M Trial series

Objectives: To determine the response to increased crop inputs (fungicide and nitrogen) of a range of canola variety types.

Key points:

- Increasing the input of fungicide and nitrogen increased grain yield in 7/9 varieties.
- 45Y28 RR and Nuseed Diamond yielded > 3 t/ha with High Input management.
- Spring non-TT varieties including 45Y28 RR, NCH18Q421 (Xseed Condor) and Nuseed Diamond were the highest yielding group, 0.4 and 0.5 t/ha higher yielding than the Spring TT and Winter varieties, respectively.

Treatments: Two management levels (combination of nitrogen and fungicide) applied to 9 canola varieties.

Table 1. Influence of management strategy and variety on grain yield (t/ha).

Cultivar	Management Level					
	Low input		High input		Mean	
	Yield t/ha		Yield t/ha		Yield t/ha	
Hyola 970CL (Winter)	1.98	fgh	2.18	ef	2.08	e
SF Nizza CL (Winter)	1.14	i	2.96	a	2.05	e
Phoenix CL (Winter)	1.88	fgh	2.59	bc	2.24	cde
ATR Wahoo TT (Spring)	2.18	ef	2.52	cd	2.35	cd
HyTTec Trifecta (Spring)	1.75	h	2.47	cde	2.11	e
SF Ignite TT (Spring)	2.09	fg	2.20	def	2.14	de
45Y28 RR (Spring)	1.81	gh	3.12	a	2.46	bc
NCH18Q421 (Spring)	2.57	bc	2.88	ab	2.73	a
Nuseed Diamond (Spring)	2.18	ef	3.08	a	2.63	ab
Mean	1.95	b	2.67	a	2.31	
LSD Cultivar p = 0.05	0.23		P val		<0.001	
LSD Management p=0.05	0.26		P val		0.003	
LSD Cultivar x Man. P=0.05	0.33		P val		<0.001	

Table 2. Details of the management levels.

Sowing date:		28-April	
Plant population:		60 plants/m ²	
Seed Treatment:		Jockey + Poncho	
Basal Fertiliser:		100 kg/ha MAP (10 kg/ha N)	
		150 kg/ha SOA (30 kg/ha N)	
		Low input	High input
Nitrogen:	6-leaf	65 kg/ha	65kg/ha
	Bud visible	---	130 kg/ha
Total N Applied:		105 kg/ha	235 kg/ha
Fungicide:	30 May	Prosaro 0.45 L/ha	
	20% Bloom	Prosaro 0.45 L/ha	Aviator Xpro 0.8 L/ha
	50% Bloom	Prosaro 0.45 L/ha	

Trial 4. Plant density for hyper-yielding

Objectives: To determine optimum plant density for hyper-yielding canola

Key points:

- There was no overall effect of seeding rate on grain yield, but 45Y28 RR was generally higher yielding than HyTTec Trifecta.
- This trial will be completed again in 2021 with a winter cultivar.

Treatments: Two varieties, one TT and one non-TT, sown at four seeding rates to target 15, 30, 50 and 75 plants/m².

Table 1. Grain yield (t/ha), % site mean, protein (%), test weight (kg/hl) and screenings (%).

Target Seed Rate (m ²)	Variety	Grain Yield		Grain Quality		
		Yield (t/ha)	Site Mean (%)	Oil (%)	Protein (%)	Test wt (kg/HL)
15	45Y28 (RR)	3.95 a	110.7	43.6	18.8	64.1
15	HyTTec Trifecta	3.29 abc	92.3	42.7	20.3	65.1
	Mean	3.62	101.5	43.1	19.5	64.6
30	45Y28 (RR)	3.91 ab	109.7	43.5	18.3	64.5
30	HyTTec Trifecta	3.21 c	89.8	42.3	20.2	64.6
	Mean	3.56	99.8	42.9	19.3	64.5
50	45Y28 (RR)	3.96 a	110.9	43.8	18.2	64.4
50	HyTTec Trifecta	3.08 c	86.2	42.4	20.8	64.5
	Mean	3.52	98.6	43.1	19.5	64.4
75	45Y28 (RR)	3.90 ab	109.2	43.7	18.3	64.3
75	HyTTec Trifecta	3.26 bc	91.2	41.8	20.6	64.9
	Mean	3.58	100.2	42.7	19.4	64.6
	Grand Mean	3.57	100.0	43.0	19.4	64.5
LSD seed rate (p = 0.05)		ns	ns	ns	ns	ns
LSD Variety		0.22	6.2	ns	0.7	ns
LSD Var x seed rate		0.67	18.8	ns	0.6	ns
P Val seed rate						
P Val Variety						
P Val Var x seed rate		0.028	0.028	0.073	<0.001	0.309
CV		12.63	12.6	2.4	2.2	0.9

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	7 July	65 N kg/ha
	29 July	104 N kg/ha
Fungicide:	17 June	Prosaro 450ml/ha
	10 September	Prosaro 450ml/ha

Trial 5. Nitrogen nutrition for hyper-yielding canola

Objectives: To determine optimum nitrogen nutrient management (including rate and timing) for hyper-yielding canola.

Key points:

- All nitrogen treatments yielded more than nil N and 100% Upfront (all N applied at sowing) treatment.
- N was possible lost from denitrification just after sowing as the site became waterlogged.
- There was no yield difference between nitrogen timing for all treatments applied after sowing.
- Oil concentration was highest where nil N was applied.
- A nitrogen trial will be sown in 2021 with the inclusion of a winter cultivar.

Treatments: Nine nutrition rate and timing treatments applied to 45Y28 RR.

Table 1. Detailed treatment list, yield (t/ha) & % Site Mean.

Trt.	Treatments	Nitrogen						Yield		Mean
		Kg N/ha						(t/ha)	(%)	
		Sowing	6L	BV	SF	MF	Total			
1	Nil	16	---	---	---	---	16	3.22 b		74.8
2	33.3%	16	30	---	---	---	46	4.53 a		105.2
3	200%	16 + 90	30	30	30	---	196	4.73 a		110.0
4	100% Upfront	16 + 90	---	---	---	---	106	3.42 b		79.6
5	100% Split	16	30	30	30	---	106	4.61 a		107.1
6	100% Bud visible	16	---	90	---	---	106	4.47 a		103.9
7	100% Start flower	16	---	---	90	---	106	4.49 a		104.3
8	100% Split late foliar	16	30	30	15*	15*	106	4.47 a		103.9
9	100% Split + Manure	16	30	30	30	---	106	4.78 a		111.1
Mean								4.30		100.0
LSD (p=0.05)								0.51		11.7
P Val								<0.001		<0.001

6L= 6 leaf BV = Bud visible, SF = Start of flowering, MF = mid-flowering

MAP was applied at a rate of 100kg/ha and all treatments received 30kg/ha of SOA at sowing.

*Late foliar treatments (treatment 8) applied as UAN through flat fan nozzles.

Table 2. Influence of nitrogen rate on quality, protein (%), test weight (kg/HL) and screenings (%).

Trt.	Treatments	Oil		Test weight		Protein
		(%)		(kg/HL)		
1	Nil	44.1	a	64.3	-	18.4 d
2	33.3%	43.2	abc	64.8	-	18.8 bcd
3	200%	43.1	abc	65.1	-	19.5 ab
4	100% Upfront	43.3	ab	64.7	-	18.5 cd
5	100% Split	42.7	bc	64.8	-	19.5 ab
6	100% Bud visible	43.0	bc	64.6	-	19.3 abc
7	100% Start flower	43.0	bc	64.5	-	19.5 ab
8	100% Split late foliar	42.2	c	64.6	-	19.5 ab
9	100% Split + Manure	42.5	bc	64.4	-	19.9 a
Mean		43.0		64.7		19.2
LSD (p=0.05)		1.0		0.6		0.9

P Val	0.046	0.272	0.020
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Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:		As per treatment list
Fungicide:	17 June	Prosaro 450ml/ha
	10 September	Prosaro 450ml/ha

Trial 6. Disease management for hyper-yielding canola

Objectives: To determine optimum foliar fungicide management for hyper-yielding canola.

Individual objectives specific to the trial are:

3. Determine the value of contrasting major gene blackleg resistance groups in HYC environments:
 - a. BC (45Y28 RR and 45Y93 CL) – largely ineffective major gene resistance (good minor gene resistance).
 - b. ABD (HyTTec Trifecta) – currently effective major gene resistance.
4. Determine the effect of fungicide management strategies on disease control (upper canopy blackleg and sclerotinia), grain yield and profitability.

Key points:

- The Roundup Ready cultivar 45Y28 RR was consistently higher yielding than the TT cultivar HyTTec Trifecta.
- Disease levels were low overall, with only low-level blackleg observed. Although 45Y28 RR does not have effective major gene blackleg resistance, it did not have more blackleg infection than HyTTec Trifecta.
- Aviator Xpro and Miravis Star at 20% bloom, both followed by Prosaro at 50% bloom, were higher yielding than the untreated control, but by less than 0.25 t/ha which would have not been profitable.

Treatments: Six Fungicide strategies applied to two varieties

Table 2. Influence of management strategy and variety of wheat grain yield (t/ha).

Treatment			45Y28 RR	HyTTec Trifecta	Mean
GS00	GS31	GS39-49	Yield (t/ha)	Yield (t/ha)	Yield (t/ha)
Prosaro 300ml/ha	---	---	4.29 b	3.67 d	3.98 b
Prosaro 300ml/ha	Prosaro 450ml/ha	---	4.31 b	3.94 c	4.13 ab
Prosaro 300ml/ha	Prosaro 450ml/ha	Prosaro 450ml/ha	4.34 ab	3.84 cd	4.09 ab
Prosaro 300ml/ha	Aviator 800ml/ha	Prosaro 450ml/ha	4.55 a	3.87 cd	4.21 a
Prosaro 300ml/ha	Miravis Star 1000ml/ha	Prosaro 450ml/ha	4.45 ab	3.99 c	4.22 a
Prosaro 300ml/ha	Revystar 1000ml/ha	Prosaro 450ml/ha	4.43 ab	3.82 cd	4.13 ab
Mean			4.40 a	3.85 b	4.13
LSD Variety P=0.05			0.20	P val	0.003
LSD Fungicide P=0.05			0.17	P val	0.075
LSD Variety x Fungicide P=0.05			0.24	P val	0.443
CV			4.00		

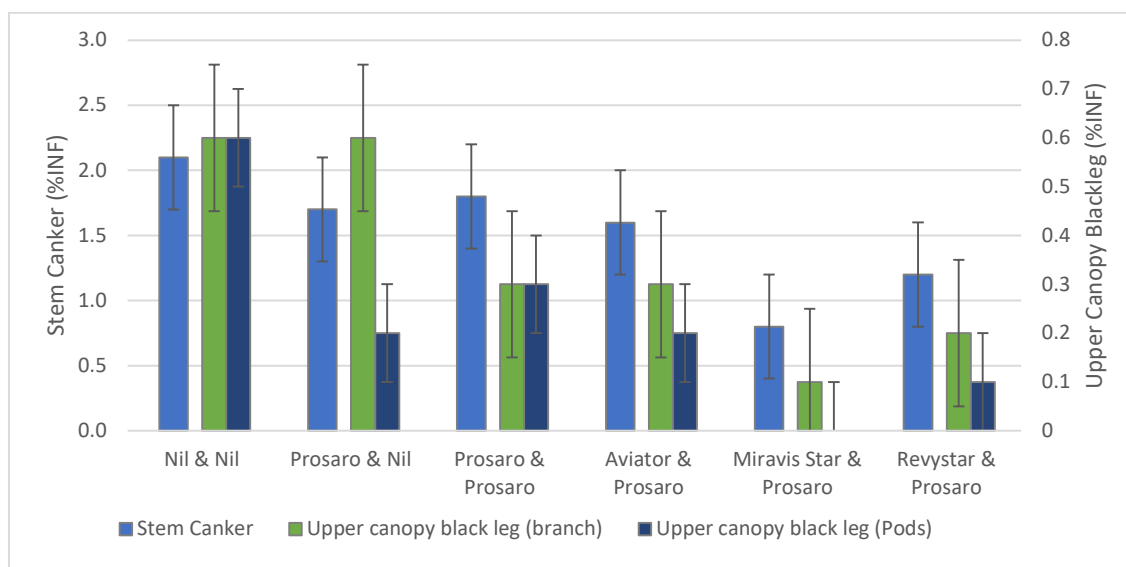


Figure 1. Average disease infection (%INF) for each fungicide management regime averaged across two varieties.

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		28-April
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:	7 July	65 N kg/ha
	29 July	104 N kg/ha
Fungicide:		As per treatment list

2020 SA Crop Technology Centre - Millicent, South Australia

Sown: 8 May 2020

Harvested: 24 December 2020

Rotation position: 2019 Wheat

Soil type & management: Neutral-slightly alkaline Organosol (Peat soil) – high organic matter (0-30cm)

Mehlich P (ppm) 0-30 cm: 4.9

pH (CaCl₂) 0-30 cm: 7.59

Organic Carbon (%) 0-30 cm: 24.9

Trial 1. HYC Winter canola screen

Objectives: To examine the suitability of elite commercial and unreleased winter canola cultivars for Hyper-yielding regions

Key Points:

- There was no difference in grain yield or oil concentration in the nine winter cultivars in this trial.
- Seed size was highest in Edimax CL and CL210004, and lowest in CL82003 and CL82005.
- CL82005 has since been released as Hyola Feast CL.

Treatments: 9 winter canola cultivars sown in small plots (half of normal plot length) with three replicates.

Table 1. Yield of the variety evaluation trial (t/ha) and grain quality results.

Variety	Start	Yield		Grain Quality		
	Flowering Date	Yield (t/ha)		Oil %	TSW gram	Protein %
Hyola 970CL (CLF)	7-Oct	4.05	-	46.9	4.2 cd	16.2
Edimax CL (CLF)	12-Oct	4.03	-	45.5	4.7 a	15.4
SF Nizza CL (CLF)	25-Sep	4.17	-	46.9	4.4 bc	17.1
CL82003 (CLF)	29-Sep	4.29	-	45.9	3.9 e	15.9
CL82004 (CLF)	25-Sep	4.19	-	47.4	4.2 d	16.2
CL82005 (CLF)	29-Sep	4.28	-	47.0	3.8 e	16.5
CL210003 (CLF)	12-Oct	3.90	-	45.8	4.6 ab	15.1
CL210004 (CLF)	12-Oct	4.42	-	44.3	4.7 a	16.2
SF65-056-CL (CLF)	25-Sep	3.91	-	46.2	4.1 de	16.1
Mean		4.14		46.21	4.30	16.07
LSD 0.05		0.78		2.54	0.24	1.34
P Val		0.875		0.307	<0.001	0.171

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:	8-May	
Seed Rate:	60 seeds/m ²	
Sowing Fertiliser:	100kg/ha MAP	
Seed Treatment:	Jockey + Poncho	

Nutrition:	14 July	46 kg/ha N (Urea 100 kg/ha)
	11 August	30 kg/ha N (SOA 150 kg/ha)
Fungicide:	8 July	Prosaro 450ml/ha
	10 September	Aviator Xpro 650ml/ha

Trial 2. HYC Spring canola screen

Objectives: To examine the suitability of elite commercial and unreleased spring cultivars for Hyper-yielding regions

Key Points:

- The mid-maturity cultivars 45Y93 CL, 45Y91 CL and Nuseed Quartz were the highest yielding cultivars. These cultivars all had at least average oil concentration.
- Average grain yield of the spring screen was 3.28 t/ha compared with 4.14 t/ha in the winter screen. Only one of 16 spring cultivars achieved 4 t/ha grain yield compared with 7/9 in the winter screen.
- The conventional and Clearfield cultivars were on average 0.4 and 0.5 t/ha (13 and 16%) higher yielding than the triazine tolerant cultivars, highlighting the fitness penalty that comes with triazine tolerance.
- Many of the lowest yielding cultivars also had very low oil, reducing profitability further.

Treatments: 16 cultivars sown in small plots (half of normal plot length) with three replicates.

Table 1. Yield of the variety evaluation trial (t/ha) and grain quality results.

Variety	Start	Yield		Grain Quality				
	Flowering	Yield (t/ha)		Oil%		TSW (g)		Protein%
Nuseed Diamond (Conventional)	3-Aug	2.94	de	45.3	b-e	4.2	cde	19.1
Nuseed Quartz (Conventional)	28-Aug	3.98	ab	45.3	b-e	4.2	cde	19.1
SF Ignite (TT)	6-Sep	3.20	d	44.5	cde	4.2	c-f	19.3
HyTTec Trifecta (TT)	28-Aug	3.33	cd	46.1	a-d	3.9	ghi	20.5
HyTTec Trophy (TT)	24-Aug	3.27	d	43.6	de	4.0	e-h	19.7
ATR Wahoo (TT)	8-Sep	2.86	de	43.1	e	3.6	i	20.1
CHYB3668TT (TT)	8-Sep	3.21	d	43.7	de	4.1	efg	20.2
ADV Exhilarate (TT)	28-Aug	2.44	e	44.5	cde	3.6	i	20.7
ADV Remarkable (TT)	20-Aug	3.05	d	43.8	de	4.4	bcd	19.9
ADV Magnificent (TT)	8-Sep	3.41	bcd	45.5	a-e	4.4	bc	20.3
ADV Sensational (TT)	3-Sep	2.98	de	44.3	cde	4.1	d-g	20.0
45Y93 CL (CLF)	28-Aug	4.15	a	45.3	b-e	3.8	hi	20.4
ADV Equinox (CLF)	26-Aug	2.99	de	47.5	ab	4.0	e-h	20.3
ADV Galaxy (CLF)	20-Aug	3.29	d	48.2	a	4.5	ab	18.3
SF65-050CL (CLF)	28-Aug	3.43	bcd	45.5	a-e	4.7	a	18.4
45Y91 CL (CLF)	30-Aug	3.89	abc	46.8	abc	4.0	fgh	19.0
Mean		3.28		45.2		4.1		19.9
LSD 0.05		1.49		2.86		0.27		2.08
P Val		<0.001		0.038		<0.001		0.230

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		8-May
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nutrition:	14 July	46 kg/ha N (100 Urea kg/ha)
	11 August	30 kg/ha N (SOA 150 kg/ha)
Fungicide:	8 July	Prosaro 450ml/ha
	28 September	Aviator Xpro 650ml/ha

Trial 3. HYC G.E.M Trial series

Objectives: To determine the response to increased crop inputs (fungicide and nitrogen) of a range of canola variety types.

Key Points:

- There was no overall effect of increasing crop inputs or an interaction between input and variety choice.
- There were however large differences in yield between cultivars with the winter cultivars and the spring Clearfield cultivars the standouts. This is especially important since all cultivars (with the exception of the open-pollinated ATR Wahoo) would have similar seed cost.
- The winter cultivars grew more than double the vegetative biomass than the spring cultivars; 40% more biomass by maturity and were twice as tall, but grain yield was the same as the best spring Clearfield cultivars.
- The differences between winter and spring varieties in this trial highlights the need for the development of cultivars somewhere between these two groups for Hyperyielding grains regions.
- To improve grain yield in this region, there will need to be an increase in harvest index of the winter cultivars or an increase in biomass of the spring cultivars.
- Spring cultivars that were fast to develop (e.g. Nuseed Diamond) or slow to grow biomass (TT) were severely penalised for grain yield and even a very high conversion of biomass to grain (e.g. HyTTec Trifecta grew 3.57 t/ha grain with 9 t/ha biomass at maturity) was not enough to make up for low biomass.

Treatments: Two management levels applied to 9 varieties

Table 1. Influence of management strategy and variety on grain yield (t/ha).

	Management Level		
	Low input	High input	Mean
Cultivar	Yield t/ha	Yield t/ha	Yield t/ha
Hyola 970CL (Winter)	3.64 -	4.08 -	3.86 ab
SF Nizza CL (Winter)	3.66 -	4.23 -	3.95 ab
Phoenix CL (Winter)	4.00 -	4.50 -	4.25 a
SF Ignite (Spring)	3.14 -	3.08 -	3.11 c
HyTTec Trifecta (Spring)	3.55 -	3.57 -	3.56 b
ATR Wahoo (Spring)	2.64 -	3.04 -	2.84 cd
45Y93CL (Spring)	4.01 -	4.27 -	4.14 a
Diamond (Spring)	2.58 -	2.50 -	2.54 d
44Y90CL (Spring)	3.79 -	3.94 -	3.86 ab
Mean	3.69 -	3.45 -	3.57
LSD Cultivar p = 0.05	0.42	P val	<0.001
LSD Management p=0.05	0.28	P val	0.073
LSD Cultivar x Man. P=0.05	0.59	P val	0.687

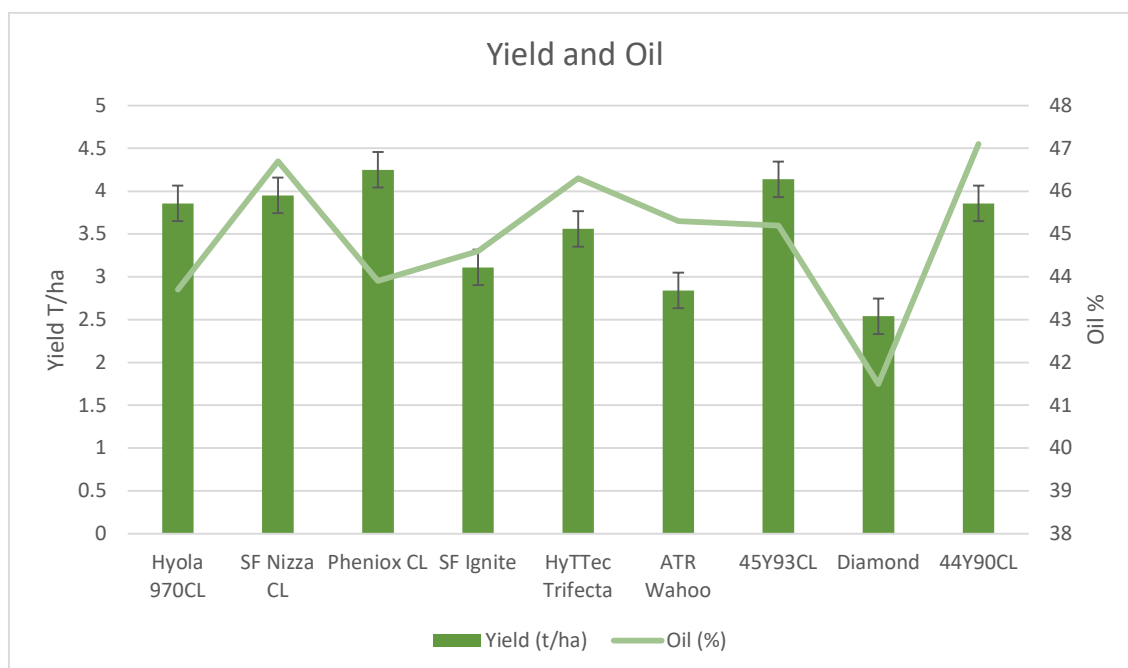


Figure 1. Influence of variety on Dry Matter (t/ha) production at mid flower and harvest and crop height at harvest.

Table 2. Details of the management levels.

Sowing date:		8-May	
Plant population:		60 plants/m ²	
Seed Treatment:		Jockey + Poncho	
Basal Fertiliser:		100 kg/ha MAP (10 kg/ha N)	
		150 kg/ha SOA (30 kg/ha N)	
		Low input	High input
Nitrogen:	6-leaf	30 N kg/ha	30 N kg/ha
	Bud visible	---	30 N kg/ha
Total N Applied:		70 N kg/ha	100 N kg/ha
Fungicide:		Prosaro 0.45 L/ha	
	8 July	Prosaro 0.45 L/ha	
	20% Bloom	Prosaro 0.45 L/ha	Aviator Xpro 0.8 L/ha
	50% Bloom		Prosaro 0.45 L/ha*

*Due to high crop height winter cultivars did not receive the 50% bloom spray. Overall disease levels were low with missed application unlikely to affect grain yields.

Trial 4. Plant density for hyper-yielding

Objectives: To determine optimum plant density for hyper-yielding canola

Key Points:

- There was no difference in grain yield with any plant density above 20 plants/m² but yield was reduced when plant density dropped below 20 plants/m² for both cultivars.
- Similar to the GEM trial, the Clearfield cultivar 45Y93 CL was higher yielding than the TT cultivar HyTTec Trifecta.
- Seed size (thousand seed weight) increased as plant population increased, possibly due to their being a greater portion of grain yield (>75%) deriving from the main stem and primary branches in higher plant populations. At low populations yield derived from the main stem and primary branches was ~55%.

Treatments: Two varieties sown at four seeding rates.

Table 1. Grain yield (t/ha)

Plant Population (m ²)	Grain Yield (t/ha)			
	45Y93 (CL)	HyTTec Trifecta	Mean	
14 plants	4.07 -	3.47 -	3.77	b
21 plants	4.44 -	3.59 -	4.01	a
39 plants	4.35 -	3.59 -	3.97	a
47 plants	4.50 -	3.68 -	4.09	a
Mean	4.34 a	3.58 b		
Plant Population	LSD	0.18	P val	0.010
Cultivar	LSD	0.41	P val	0.011
Plant Pop. x Cultivar	LSD	0.25	P val	0.497
CV	4.25			

Table 2. Thousand Seed Weight (t/ha)

Plant Population (m ²)	Thousand Seed Weight (gram)			
	45Y93 (CL)	HyTTec Trifecta	Mean	
14 plants	3.8 -	4.0 -	3.9	bc
21 plants	3.9 -	3.9 -	3.9	c
39 plants	4.0 -	4.1 -	4.0	ab
47 plants	4.0 -	4.2 -	4.1	a
Mean	3.9 b	4.0 a		
Plant Population	LSD	0.12	P val	0.003
Cultivar	LSD	0.03	P val	0.001
Plant Pop. x Cultivar	LSD	0.17	P val	0.491

Five plants were divided into the components of Main Stem, Primary Branches and Secondary Branches. As plant population increased, the proportion of seed derived from the main stem increased

from < 10% to ~25%. At the lowest population secondary branches provided 40% of grain yield but less than 10% grain yield at the highest population.

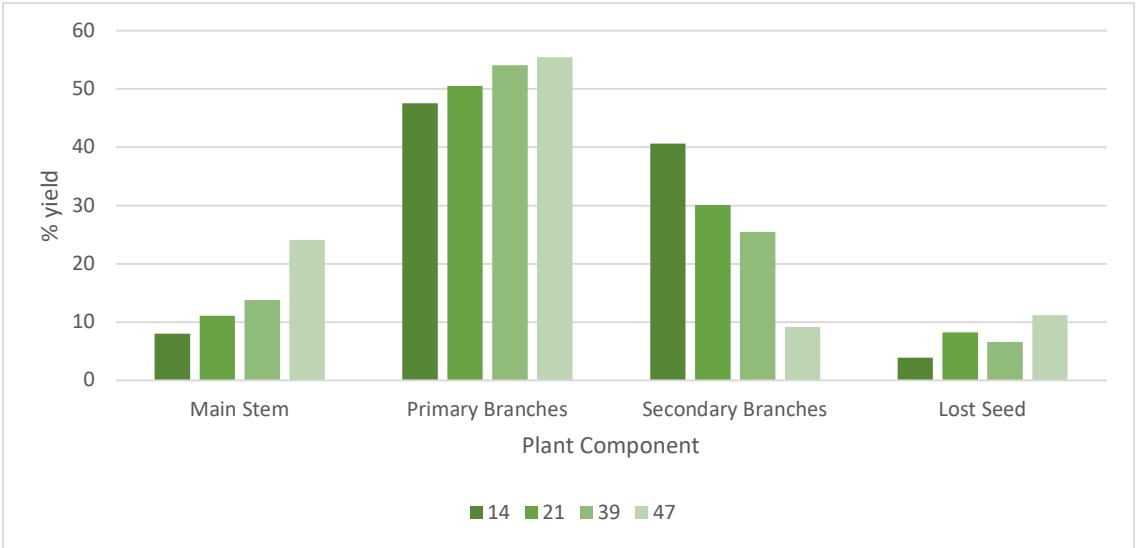


Figure 1. Yield contribution (%) from plant components and seed lost (seed lost in bags between collection and processing).

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		8-May
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nutrition:	14 July	45 N kg/ha
	11 August	SOA 150 kg/ha
Fungicide:	8 July	Prosaro 450ml/ha
	28 September	Aviator Xpro 650ml/ha

Trial 5. Nitrogen nutrition for hyper-yielding canola

Objectives: To determine optimum nitrogen nutrient management for hyper-yielding canola.

Key Points:

- The application of all nitrogen at sowing either or alone or with pig manure was higher yielding than the lower N rates (16 and 46 kg/ha N) and where all N was applied at bud visible stage.
- The GEM trial showed that the spring cultivars were likely biomass limited but the winter cultivars were likely harvest index limited, therefore the nutrition trial will be conducted in a winter and a spring cultivar in 2021 to determine optimum strategies for these diverse types.
- There was no effect of nitrogen management on oil concentration. The 'soft' spring environment here may have limited the effect of nitrogen on oil, as N will generally reduce oil in low-medium rainfall environments.

Treatments: Nine nutrition rates and timing applied to the cultivar 45Y93 CL.

Table 1. Detailed treatment list, yield (t/ha).

Trt.	Treatments	Nitrogen						Yield	
		Kg N/ha						(t/ha)	
		Sowing	6L	BV	SF	MF	Total		
1	Nil	16	---	---	---	---	16	3.82	bc
2	33.3%	16	30	---	---	---	46	3.60	c
3	200%	16 + 90	30	30	30	---	196	4.33	ab
4	100% Upfront	16 + 90	---	---	---	---	106	4.44	a
5	100% Split	16	30	30	30	---	106	4.22	ab
6	100% Bud visible	16	---	90	---	---	106	3.86	bc
7	100% Start flower	16	---	---	90	---	106	4.08	abc
8	100% Split late foliar	16	30	30	15*	15*	106	3.93	abc
9	100% Split + Manure	16	30	30	30	---	106	4.50	a
Mean								4.08	
LSD (p=0.05)								0.58	
P Val								0.047	
CV								9.78	

6L= 6 leaf BV = Bud visible, SF = Start of flowering, MF = mid-flowering

MAP was applied at a rate of 100kg/ha and all treatments received 30kg/ha of SOA at sowing.

*Late foliar treatments (treatment 8) applied as UAN through flat fan nozzles.

Table 2. Influence of nitrogen rate on oil (%), protein (%) and thousand seed weight (TSW).

Trt.	Treatments	Oil		TSW		Protein	
		(%)		(gram)		(%)	
1	Nil	46.5	-	3.8	-	19.4	-
2	33.3%	46.7	-	3.8	-	19.2	-
3	200%	46.3	-	4.0	-	20.4	-
4	100% Upfront	46.4	-	3.9	-	19.8	-
5	100% Split	46.3	-	3.9	-	20.2	-
6	100% Bud visible	46.1	-	3.9	-	19.8	-
7	100% Start flower	45.9	-	4.0	-	20.3	-
8	100% Split late foliar	46.4	-	3.9	-	19.9	-
9	100% Split + Manure	46.3	-	3.9	-	19.9	-

Mean	46.32	3.90	19.86
LSD (p=0.05)	1.22	0.17	0.86
P Val	0.966	0.457	0.133

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		8-May
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nitrogen:		As per treatment list
Fungicide:	8 July	Prosaro 450ml/ha
	28 September	Aviator Xpro 650ml/ha

Trial 6. Disease management for hyper-yielding canola

Objectives: To determine optimum foliar fungicide management for hyper-yielding canola.

Individual objectives specific to the trial are:

5. Determine the value of contrasting major gene blackleg resistance groups in HYC environments:
 - a. BC (45Y93 CL) – largely ineffective major gene resistance (good minor gene resistance).
 - b. ABD (HyTTec Trifecta) – currently effective major gene resistance.
6. Determine the effect of fungicide management strategies on disease control (upper canopy blackleg and sclerotinia), grain yield and profitability.

Key Points:

- There was no effect of fungicide treatment on grain yield of either cultivar.
- Like other trials, 45Y93 CL was higher yielding than HyTTec Trifecta.
- There was no interaction between fungicide management and cultivar choice, effectively showing that there was no difference advantage of having a cultivar with effective major gene blackleg resistance compared with a cultivar with ineffective resistance.
- While sclerotinia, blackleg and Alternaria were present on site all disease where are low levels 45Y93 had a significantly higher incidence of sclerotinia infect in comparison to HyTTec Trifecta. However, disease pressure was not high enough to separate fungicide treatment effects.
- A disease management trial will be completed again in 2021 and will include a winter cultivar and early season (seed and 6-leaf) fungicide treatments.

Treatments: Six Fungicide strategies (combination of triazole and SDHI products) applied to two varieties, 45Y93 CL and HyTTec Trifecta.

Table 3. Influence of management strategy and variety of canola grain yield (t/ha).

Treatment			45Y93 CL	HyTTec Trifecta	Mean
GS14	GS31	GS39-49	Yield (t/ha)	Yield (t/ha)	Yield (t/ha)
Prosaro 300ml/ha	---	---	4.15 -	3.38 -	3.76 -
Prosaro 300ml/ha	Prosaro 450ml/ha	---	4.41 -	3.60 -	4 -
Prosaro 300ml/ha	Prosaro 450ml/ha	Prosaro 450ml/ha	4.58 -	3.53 -	4.05 -
Prosaro 300ml/ha	Aviator 800ml/ha	Prosaro 450ml/ha	4.49 -	3.53 -	4.01 -
Prosaro 300ml/ha	Miravis Star 1000ml/ha	Prosaro 450ml/ha	4.40 -	3.62 -	4.01 -
Prosaro 300ml/ha	Revystar 1000ml/ha	Prosaro 450ml/ha	4.41 -	3.60 -	4.01 -
Mean			4.41 a	3.54 b	4.13
LSD Variety P=0.05			0.14	P val	<0.001
LSD Fungicide P=0.05			0.22	P val	0.131

LSD Variety x Fungicide P=0.05	0.31	P val	0.743
CV	5.461		

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		8-May
Seed Rate:		60 seeds/m ²
Sowing Fertiliser:		100kg/ha MAP
Seed Treatment:		Jockey + Poncho
Nutrition:	14 July	46 N kg/ha (100 kg/ha urea)
	11 August	30 kg/ha N (SOA 150 kg/ha)
Fungicide:		As per treatment list