



AgGrow

AGRONOMY + RESEARCH



CANOLA VARIETY EVALUATION TRIALS

Beelbanger, 2022

INDEPENDENT AGRONOMY ADVICE + CUTTING EDGE RESEARCH

Conventional/Clearfield, Glyphosate & Triazine Tolerant Canola Variety Trials

KEY POINTS

- The 2022 season was wet all round, from above average summer rain to record breaking October rain, resulting in over 800mm rain for Griffith for the year.
- The highest yielding varieties in the Conventional/Clearfield trial were 44Y94CL, 45Y95CL, Nuseed Diamond and numbered line PS-22CL214. Hyola Equinox CL, Outlaw and numbered line PS-22CL214 were the standout performers for oil.
- In the Glyphosate trial 45Y28(RR), 44Y30(RR) and InVigor R 4520P were the highest yielding varieties. The experimental line XC220525 and Hyola Garrison XC were the varieties with the highest oil contents.
- Hyola Blazer TT, HyTTec Trident, HyTTec Trifecta, HyTTec Trophy, InVigor T 4510, PS-22CT107 and HyTTec Velocity were the top yielding varieties in the Triazine Tolerant trial. For oil HyTTec Trident, ATR-Bonito and lined variety NT0504 were the varieties which had the highest contents.

BACKGROUND

In 2022 Ag Grow Agronomy and Research, in conjunction with AGT, BASF, Nuseed, Pacific Seeds and Pioneer Seeds, conducted replicated canola variety trials evaluating potential and newly released varieties alongside currently grown varieties under local dryland conditions. These trials are set up to compliment the nearest SW NVT canola trial and give us the opportunity to see if new varieties offer any advantage in terms of yield and quality over the current commercially grown varieties in our environment. These trials are even more important this year, given the area of canola grown in the district has been increasing in recent years, and that 2022 had the largest area of our client based ever sown to canola.

This is the fifth season Ag Grow Agronomy and Research have conducted such trials, with varieties included in the trials selected by Ag Grow Agronomy and collaborating seed companies. The trials cover

four types of herbicide tolerant technologies including Conventional, Clearfield (CL), Roundup Ready (RR) and Triazine Tolerant (TT). In addition, there are also varieties with 'Stacked' herbicide tolerance including varieties with combined TT+CL, TT+RR, Truflex+CL, Liberty+Truflex, Liberty+TT and Liberty+Truflex+TT included in the trials.

In 2022 AGT's newly released Triazine Tolerant varieties Bandit TT and Renegade TT and conventional variety Outlaw were included in the trial, along with Triazine Tolerant varieties InVigor T 4511 from BASF and HyTTec Velocity from Nuseed.

It is important to not rely solely on data from a single trial in a single year when making decisions on new varieties. The data from these trials should be used in conjunction with the data from long term MET analysis through NVT, which uses 5 years of data across sites.

TRIAL DETAILS

Canola variety evaluation trials were established at the Ag Grow Agronomy research farm "Ridgetop" Beelbanger, 16km NE of Griffith in April 2022. The paddock chosen for the trials was limed in January 2022, and had 100kg urea applied before a full mechanical incorporation.

Varieties were grouped according to their herbicide tolerance (Clearfield/Conventional, Glyphosate and Triazine Tolerant), with 3 separate fully replicated trials designed and implemented. There were 9 entries in the Clearfield/Conventional trial, 9 entries in the Glyphosate trial and 14 entries in the Triazine Tolerant (TT) trial, table 1. Each trial was managed according to their herbicide technology. The characteristics of each variety in the trial is shown in table 2.

The trials were sown on 25th April 2022 with 80 kg/ha MAP, following lupins in 2021. An additional 160 kg/ha urea was topdressed in July. Sowing rates for each variety were calculated based on a target plant population of 40 plants/m², 80% field establishment, and using seed size and germination percentage (provided by the company for each line).

Each trial was replicated three times, with plot sizes 12m by 1.75m (21m²). All trials were sprayed with 1L/ha Rustler and 2L/ha Gramoxone before sowing. In addition, in a separate pass, the Triazine Tolerant trial also received 1kg/ha Atrazine 900 before sowing. Appropriate pest, disease and weed control were undertaken on each trial. The trials were harvested on 17th November 2022.



Table 1: Canola variety trial entries grouped by herbicide tolerance 2022.

Entry No.	CL - Clearfield/Conventional
1	Hyola Equinox CL
2	PS-22CL214
3	Nuseed Diamond
4	Nuseed Quartz
5	43Y92(CL)
6	44Y94(CL)
7	45Y93(CL)
8	45Y95(CL)
9	Outlaw

Entry No.	XX/RR/XC - Glyphosate & Stacked
1	Hyola Garrison XC
2	XC220525
3	InVigor R 4022P
4	InVigor R 4520P
5	AN22LR008
6	Nuseed Raptor
7	Nuseed Emu
8	44Y30(RR)
9	45Y28(RR)

Entry No.	CT & TT - Triazine Tolerant & Stacked
1	Hyola Blazer TT
2	Hyola Enforcer CT
3	PS-22CT107
4	InVigor LT 4530P
5	InVigor T 4510
6	InVigor T 4511
7	HyTTec Trident
8	HyTTec Trophy
9	HyTTec Trifecta
10	ATR- Bonito
11	NT0504
12	HyTTec Velocity
13	Bandit TT
14	Renegade TT

Table 2: Variety characteristics of each of the varieties in the trial 2022.

	VARIETY/TRIAL	HERBICIDE TOLERANCE	MATURITY	TYPE	COMPANY	COMMENTS <i>(provided by the seed company)</i>
ENTRY Conventional /Clearfield						
1	Hyola Equinox CL	Clearfield	mid-early	Hybrid	Advanta Seeds	Competitive yields with 43Y92 & 44Y90; ADF R Rated for Blackleg
2	PS-22CL214	Clearfield	early-mid	Hybrid	Advanta Seeds	Similar to or Higher yields than 44Y94 & 45Y95; R Rated for Blackleg - Groups ADF, High Oil; Shorter height, more compact and improved standability over 44Y94 & 43Y92. In all CL NVT Trials across Australia in 2022, due for release in 2024, likely to be named in 2023
3	Nuseed Diamond	Conventional	early	Hybrid	Nuseed	MR blackleg rating (ABF Blackleg groups)
4	Nuseed Quartz	Conventional	mid to early-mid	Hybrid	Nuseed	R blackleg rating (ABD Blackleg groups)
5	43Y92CL	Clearfield	early	Hybrid	Pioneer Seeds	Good Plant Vigour; Ideal for Western areas with exceptional adaptability and yield for maturity.
6	44Y94CL	Clearfield	early-mid	Hybrid	Pioneer Seeds	Suits mid-April planting; Similar flowering and maturity to 44Y90 CL; Very adaptable for low and high Rainfall areas..
7	45Y93CL	Clearfield	mid	Hybrid	Pioneer Seeds	Suited to high yielding environments and irrigation; High yield potential.
8	45Y95CL	Clearfield	mid	Hybrid	Pioneer Seeds	Suits earlier sowing in cooler/higher rainfall environments; Similar flowering to 44Y94; High Yield potential.
9	Outlaw	Conventional	early	Open Pollinated	AGT	Conventional, open pollinated variety. Very quick to flower, similar to Nuseed Diamond and quicker than AV Garnet. Excellent oil content. Similar plant height to AV Garnet.
ENTRY Glyphosate						
1	Hyola Garrison XC	TruFlex/Clearfield	mid-early	Hybrid	Advanta Seeds	Dual herbicide tolerance Truflex & Clearfield; ADF R Rated for Blackleg
2	XC220525	TruFlex/Clearfield	early	Hybrid	Advanta Seeds	Experimental Line ONLY. TruFlex/CL Stack; R Rated for Blackleg - Groups ADFH, Very high Oil.
3	InVigor R 4022P	TruFlex RR	early-mid	Hybrid	BASF	PodGuard; dual herbicide tolerance - TruFlex® canola with Roundup Ready® Technology; Second generation RR trait; Stand-out TruFlex variety for yield.
4	InVigor R 4520P	TruFlex RR	early-mid	Hybrid	BASF	PodGuard; dual herbicide tolerance - TruFlex® canola with Roundup Ready® Technology. Second generation RR trait. Widely adapted TruFlex hybrid High yield potential in mid and long season areas.
5	AN22LR008				BASF	Experimental Line ONLY.
6	Nuseed® Raptor TF	TruFlex RR	early-mid	Hybrid	Nuseed	TruFlex® canola with Roundup Ready® Technology. MR blackleg rating (AD Blackleg group)
7	Nuseed® Emu TF	TruFlex RR	early	Hybrid	Nuseed	TruFlex® canola with Roundup Ready® Technology. MR blackleg rating (AB Blackleg group). Medium plant height with good harvestability.
8	44Y30RR	Roundup Ready	early-mid	Hybrid	Pioneer Seeds	High yielding; mid maturity and adaptable planting window.Blackleg resistance rating MR and resistance grouping AB.
9	45Y28RR	Roundup Ready	mid	Hybrid	Pioneer Seeds	More suited to eastern environment with high end yield
ENTRY Triazine Tolerant (TT)						
1	Hyola Blazer TT	Triazine Tolerant	mid-early	Hybrid	Advanta Seeds	Equal Highest Yields #1 across NSW NVT Trials, ADF R Rated for Blackleg
2	Hyola Enforcer CT	Clearfield/TT	mid-early	Hybrid	Advanta Seeds	Dual herbicide tolerance Clearfield & Triazine Tolerant, ADF R Rated for Blackleg
3	PS-22CT107	Clearfield/TT	mid-early	Hybrid	Advanta Seeds	Clearfield + TT Stacked Hybrid with similar yields to Hyola Blazer TT & HyTTec Trifecta; R Rated for Blackleg, Groups ADF, High Oil. In all TT NVT Trials across Australia in 2022, due for release in 2024 and likely to be named in 2023.
4	InVigor LT 4530P	Liberty /TT	early-mid	Hybrid GM	BASF	PodGuard; GM; LibertyLink canola variety; Improved control of resistant annual ryegrass.
5	InVigor T 4510	Triazine Tolerant	early-mid	Hybrid	BASF	Strong yields across a wide range of growing areas and seasonal variability
6	InVigor T 4511	Triazine Tolerant	early-mid	Hybrid	BASF	Potential T 4510 successor; Similar maturity to T 4510 with similar or slightly higher yield potential; Higher oil content than T 4510.
7	HyTTec Trident	Triazine Tolerant	early	Hybrid	Nuseed	R blackleg rating (AD Blackleg group)
8	HyTTec Trophy	Triazine Tolerant	early to early-mid	Hybrid	Nuseed	R-MR blackleg rating (AD Blackleg group)
9	HyTTec Trifecta	Triazine Tolerant	mid	Hybrid	Nuseed	R blackleg rating (ABD group)
10	ATR-Bonito	Triazine Tolerant	early to early-mid	Open Pollinated	Nuseed	MS blackleg rating (A Blackleg group)
11	NT0504	Triazine Tolerant		Open Pollinated	Nuseed	Experimental line, possible Bonito replacement
12	HyTTec Velocity	Triazine Tolerant	early	Hybrid	Nuseed	MR-MS Blackleg (AB group); compact plant height and improved pod shatter genetics
13	Bandit TT	Triazine Tolerant	early	Open Pollinated	AGT	Triazine tolerant, open pollinated variety. Similar time to flowering as ATR Stingray. Best adapted to lower rainfall and lower yield potential environments. Medium plant height.
14	Renegade TT	Triazine Tolerant	early to early-mid	Open Pollinated	AGT	Triazine tolerant, open pollinated variety. Slightly quicker to flower than ATR Bonito. Best performance under medium yield potential conditions. Short-medium plant height with good standability.

2022 Seasonal Conditions

The 2022 season was wet all round. Coming into the cropping season moisture profiles were generally full, from a wet 2021 and with rain at harvest and above average January 2022 rain. The wet weather continued at sowing, with above average rainfall in April and May, table 3.

June and July were the only months that had below average rainfall, allowing things to dry out a bit, with some severe frosts mid-July. Wet conditions then persisted for the remainder of the 2022 season.

The conditions in 2022 were conducive for a high disease pressure year, with a run of previous good years, mild temperatures and good early crop vigour. With a large area planted to canola in 2022, and after several years of increasing areas of canola, it all added to the build-up of disease and increased inoculum levels seen in crops in the local region, with sclerotinia the main concern. The trials were sprayed with Prosaro.

Table 3: 2022 Rainfall and Growing Season Rainfall (GSR) for the trial site, compared to long term rainfall taken at Griffith Airport.

MONTH	"Ridgetop" Beelbangera 2022	Griffith Airport 2022	Griffith Airport Long Term (1958 to 2022)
January	83	172	35.9
February	12	2.2	28.6
March	31.5	53	36.2
April	67	72.2	29.1
May	82.5	80.4	35.5
June	10	18.8	35.4
July	21.5	19.4	32.8
August	40	82.4	35.3
September	96.5	49.6	33.4
October	233	203.6	40.8
November	63.5	87.8	34.9
December	4*	4*	32.6
TOTAL	744.5*	841.4*	410.5
GSR (April - Oct)	550.5	526.4	242.3
<i>*Total Rainfall till 12th December</i>			

RESULTS AND DISCUSSION

Establishment, NDVI, lodging at harvest, grain yield, oil and protein were assessed on the trials. Statistically analysis was carried out using the most appropriate method, which was either ASReml or ANOVA (Analysis of Variance) in Genstat.

Establishment:

Establishment was assessed on 25th May, when the canola was at the 2-6 leaf stage. Establishment was scored from 0 to 9, with 0 indicating poor establishment and 9 indicating very even establishment.

The Conventional/Clearfield trial had an average establishment score of 6.8, with Nuseed Diamond and Hyola Equinox CL having the highest scores. The Glyphosate trial had an average establishment score of 6.8, with 44Y30(RR) and Hyola Garrison XC having the highest scores. The Triazine Tolerant trial had an average establishment score of 6.6, with NT0504 and HyTTec Trifecta having the highest scores, figure 1.

Figure 1: Canola establishment - Conventional/Clearfield (top), Glyphosate (middle) and Triazine Tolerant (bottom), 25th May 2022.



NDVI at Flowering:

An NDVI reading was taken using a handheld GreenSeeker crop sensor. NDVI's were taken 26th July 2022 at budding to 20% flowering, figure 2.

Figure 2: NDVI July 2022 - Conventional/Clearfield (top), Glyphosate (middle) and Triazine Tolerant (bottom).



The Conventional/Clearfield trial had an average NDVI of 0.74. 45Y95(CL) had the highest NDVI with 0.79, which was statistically similar to all other varieties in the trial except Outlaw and Nuseed Diamond, table 4a.

The Glyphosate trial had an average NDVI of 0.74. Nuseed Raptor had the highest NDVI with 0.77, which was statistically similar to 4 other varieties in

the trial, table 4b.

The TT trial had an average NDVI of 0.696. InVigor LT 4530P had the highest NDVI with 0.748, statistically similar to Hyola Enforcer CT, HyTTec Trifecta and NT0504, table 4c.

Tables 4a, 4b and 4c: NDVI data 26th July 2022: 4a Conventional/Clearfield (top), 4b Glyphosate (middle) and 4c Triazine Tolerant (bottom).

VARIETY	NDVI	Sig Level LSD=0.053
43Y92(CL)	0.75	<i>a</i>
44Y94(CL)	0.78	<i>a</i>
45Y93(CL)	0.76	<i>a</i>
45Y95(CL)	0.79	<i>a</i>
Outlaw	0.65	<i>b</i>
Hyola Equinox CL	0.77	<i>a</i>
Nuseed Diamond	0.63	<i>b</i>
Nuseed Quartz	0.74	<i>a</i>
PS-22CL214	0.75	<i>a</i>
Mean	0.74	
Lsd (p=0.05)	0.053	

VARIETY	NDVI	Sig Level LSD=0.0377
44Y30(RR)	0.761	<i>ab</i>
45Y28(RR)	0.759	<i>abc</i>
AN22LR008	0.754	<i>abc</i>
Hyola Garrison XC	0.744	<i>abc</i>
InVigor R 4022P	0.732	<i>bc</i>
InVigor R 4520P	0.737	<i>bc</i>
Nuseed Emu	0.639	<i>d</i>
Nuseed Raptor	0.774	<i>a</i>
XC220525	0.721	<i>c</i>
Mean	0.735	
Lsd (p=0.05)	0.0377	

VARIETY	NDVI	Sig Level LSD=0.0569
Bandit TT	0.636	<i>c</i>
Renegade TT	0.702	<i>b</i>
ATR- Bonito	0.652	<i>c</i>
InVigor T 4511	0.689	<i>c</i>
Hyola Blazer TT	0.704	<i>b</i>
Hyola Enforcer CT	0.737	<i>a</i>
HyTTec Trident	0.691	<i>c</i>
HyTTec Trifecta	0.734	<i>a</i>
HyTTec Trophy	0.707	<i>b</i>
InVigor LT 4530P	0.748	<i>a</i>
InVigor T 4510	0.664	<i>c</i>
NT0504	0.730	<i>a</i>
PS-22CT107	0.708	<i>b</i>
HyTTec Velocity	0.637	<i>c</i>
Mean	0.696	
Lsd (p=0.05)	0.0569	

Means followed by same letter or symbol do not significantly differ

Lodging Scores:

Lodging was assessed at harvest. It was scored on a scale of 0 to 9, with 0 indicating no lodging and 9 flat on the ground. Lodging was minimal in all trials in 2022, with no significant differences for lodging in any of the trials, figure 3.

Figure 3: Lodging was insignificant at harvest.



Grain Yield & Grain Quality:

The trials were harvested on 17th November 2022. Due to a couple of varieties in each trial being slightly higher in moisture at harvest, grain yield was converted to yield at 8% for all varieties.

Grain Yield:

Conventional/Clearfield Trial: The average grain yield for the Conventional/Clearfield trial was 5324 kg/ha. 44Y94CL was the highest yielding variety, yielding 5856 kg/ha, statistically higher than all other varieties in the trial except 45Y95CL, Nuseed Diamond and PS-22CL214, figure 4. The lowest yielding varieties in the trial were 45Y93(CL), Hyola Equinox CL and 43Y92(CL) .

Glyphosate Trial: The average grain yield of the Glyphosate trial was 5300 kg/ha. 45Y28(RR) was the highest yielding variety in the trial, yielding 6026 kg/ha, statistically higher than all other varieties except 44Y30(RR) and InVigor R 4520P. The lowest yielding variety in the trial was Hyola Garrison XC yielding 4229 kg/ha, significantly lower than all other varieties in the trial, figure 5.

Triazine Tolerant Trial: The TT trial had the lowest average yield of the 3 trials averaging 4935 kg/ha. Hyola Blazer TT was the highest yielding variety in the trial, yielding 5545 kg/ha, however it was statistically similar to 6 other varieties in the trial including HyTTec Trident, HyTTec Trifecta, HyTTec Trophy, InVigor T 4510, PS-22CT107 and HyTTec Velocity, figure 6. ATR- Bonito was the lowest yielding variety in the trial, yielding 3920 kg/ha, statistically lower than all other varieties in the trial except the numbered line NT0504.

Figure 4: Grain yield of the Conventional/Clearfield trial.

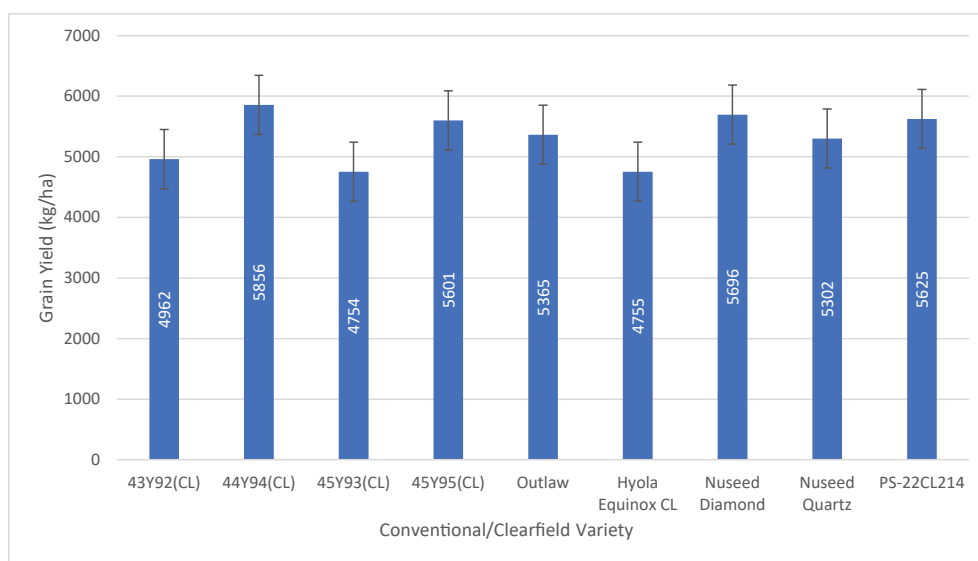


Figure 5: Grain yield of the Glyphosate trial.

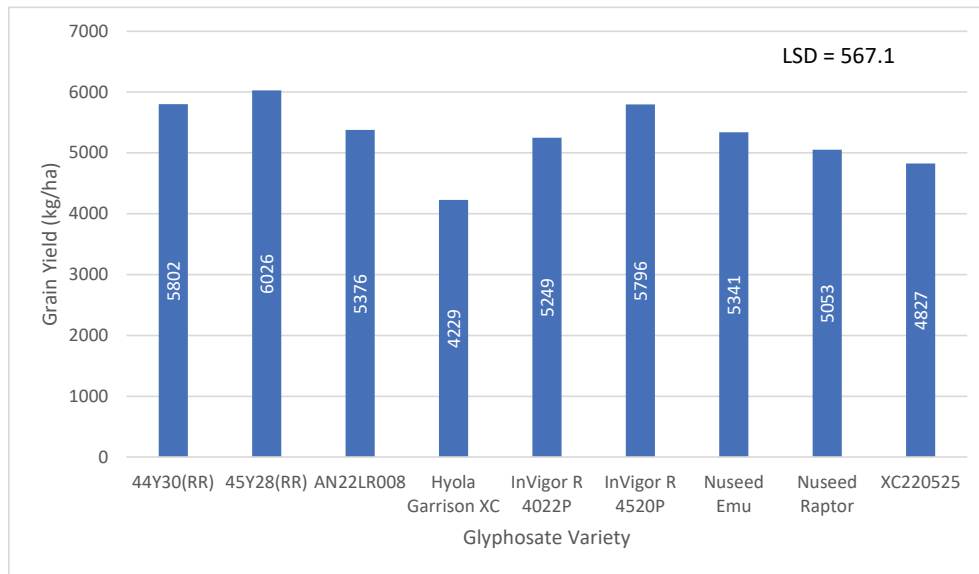
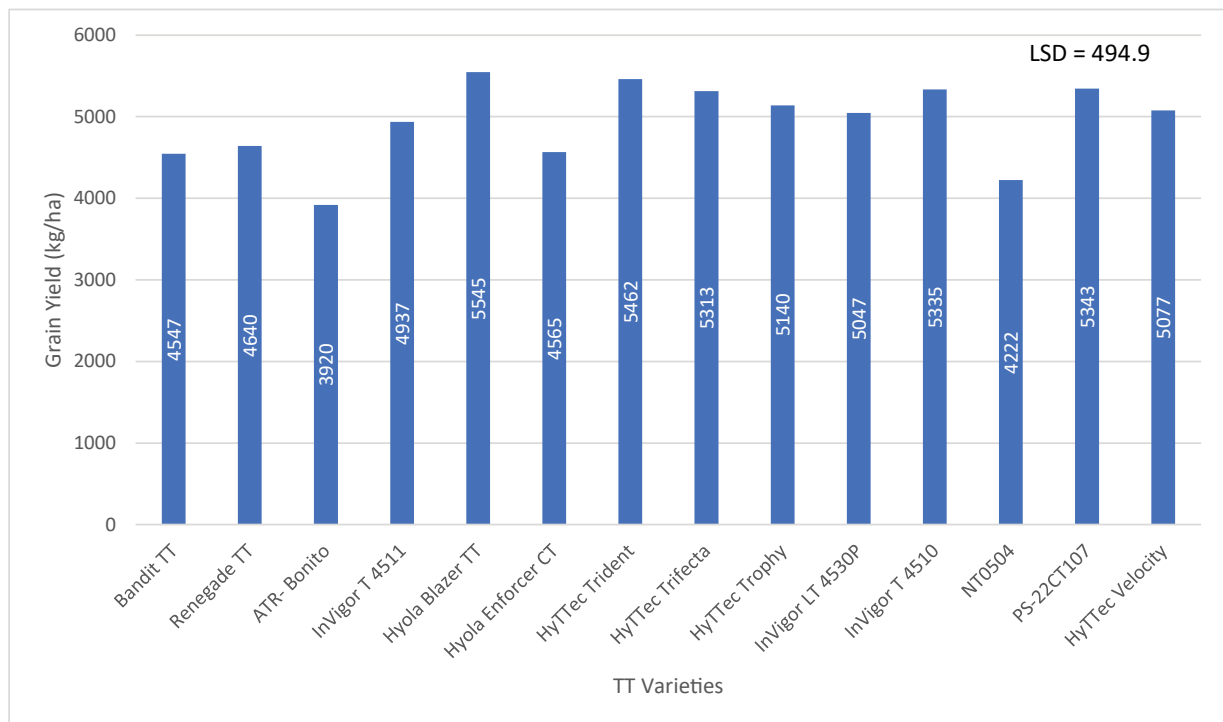


Figure 6: Grain yield of the Triazine Tolerant trial.



Grain Oil

Conventional/Clearfield Trial: Oil of the Conventional/Clearfield trial averaged 43.87%.

Hyola Equinox CL had the highest oil in the trial with 46.33%, significantly greater than all other varieties in the trial except Outlaw and PS-22CL214, table 5. 45Y95(CL) had the lowest oil in the trial with 40.19%, statistically lower than all other varieties except 45Y93(CL).

Table 5: Oil for the Conventional/Clearfield trial

VARIETY	Grain Oil (%)	Sig Level LSD=1.725
43Y92(CL)	44.06	cd
44Y94(CL)	43.67	d
45Y93(CL)	40.51	e
45Y95(CL)	40.19	e
Outlaw	46.29	ab
Hyola Equinox CL	46.33	a
Nuseed Diamond	44.59	bcd
Nuseed Quartz	44.29	cd
PS-22CL214	44.91	abcd
Mean	43.87	
Lsd (p=0.05)	1.725	

Means followed by same letter or symbol do not significantly differ

Glyphosate Trial: The average oil of the Glyphosate trial was 43.75%.

The lined variety XC220525 had the highest oil with 45.85%, higher than all other varieties in the trial except Hyola Garrison XC, table 6. 44Y30(RR) had the lowest oil in the trial with 41.55%, statistically lower than all other varieties in the trial except InVigor R 4520P.

Table 6: Oil for the Glyphosate trial.

VARIETY	Grain Oil (%)	Sig Level LSD=1.049
44Y30(RR)	41.55	f
45Y28(RR)	44.55	b
AN22LR008	44.45	b
Hyola Garrison XC	44.98	ab
InVigor R 4022P	43.44	cd
InVigor R 4520P	42.23	ef
Nuseed Emu	43.99	bc
Nuseed Raptor	42.72	de
XC220525	45.85	a
Mean	43.75	
Lsd (p=0.05)	1.049	

Means followed by same letter or symbol do not significantly differ

Triazine Tolerant Trial: The average oil of the TT trial was 42.98%.

HyTTec Trident had the highest oil content with 45.05%, however it was statistically similar to ATR-Bonito and the lined variety NT0504, table 7. Bandit TT had the lowest oil content with 39.65%, statistically lower than all other varieties in the trial.

Table 7: Oil for the Triazine Tolerant trial

VARIETY	Grain Oil (%)	Sig Level LSD=1.156
Bandit TT	39.65	i
Renegade TT	41.78	h
ATR- Bonito	44.57	ab
InVigor T 4511	41.98	gh
Hyola Blazer TT	43.86	bcde
Hyola Enforcer CT	43.29	def
HyTTec Trident	45.05	ab
HyTTec Trifecta	42.77	efgh
HyTTec Trophy	42.68	fgh
InVigor LT 4530P	42.72	efgh
InVigor T 4510	42.69	fgh
NT0504	43.96	abcd
PS-22CT107	43.3	defg
HyTTec Velocity	43.39	cdef
Mean	42.98	
Lsd (p=0.05)	1.156	

Means followed by same letter or symbol do not significantly differ





IN 2022 THIS TRIAL WAS A COLLABORATION BETWEEN
AG GROW AGRONOMY AND RESEARCH AND AGT, BASF, NUSEED,
PACIFIC SEEDS AND PIONEER SEEDS.

