

HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



LEADING THE AUSTRALIAN CANOLA INDUSTRY BY COMPARING ALL TECHNOLOGIES

Benefits to Australian Canola Growers

Pacific Seeds leads the Australian Canola Industry with their new uniquely designed Hyola Technical Development Innovation Systems Technology Trials.

These replicated trials demonstrate the latest in trial design for yield evaluations across all herbicide technology comparisons (Hybrids vs OP and GM vs non-GM) including detailed agronomic performance assessments of current vs selected new germplasm prior to commercial release.

Using a range of popular varieties from right across the Australian canola industry, combined with double and triple herbicide-stacked statistical controls unique to Pacific Seeds, the yield analysis provides for each and all of the technologies and varieties to be compared accurately, unlike any other canola trials currently conducted in Australia.

The important benefits to Australian canola growers and advisors are more detailed information on relative varietal comparative performance across different herbicide technologies (Cross-Technology), single trait or stacked, based on both single site and multi-environment (MET) analysis.



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



LEADING THE AUSTRALIAN CANOLA INDUSTRY BY COMPARING ALL TECHNOLOGIES

5m	PLOTS	XCT	TruFlex or Roundup Ready				TruFlex + Clearfield		Clearfield			Clearfield + Triazine			Triazine Tolerant			XCT				
			XX and RR				XCT	XC	XCT	CL			XCT	CT			XCT		TT			
REP 3	12	XCT					XCT			XCT				XCT				XCT				XCT
	11	XCT					XCT			XCT				XCT				XCT				XCT
	10	XCT					XCT			XCT				XCT				XCT				XCT
REP 2	9	XCT					XCT			XCT				XCT				XCT				XCT
	8	XCT					XCT			XCT				XCT				XCT				XCT
	7	XCT					XCT			XCT				XCT				XCT				XCT
REP 1	6	XCT					XCT			XCT				XCT				XCT				XCT
	5	XCT					XCT			XCT				XCT				XCT				XCT
	4	XCT					XCT			XCT				XCT				XCT				XCT
REP 1	3	XCT					XCT			XCT				XCT				XCT				XCT
	2	XCT					XCT			XCT				XCT				XCT				XCT
	1	XCT					XCT			XCT				XCT				XCT				XCT
RANGE	XCT	XX and RR (RR Rates applied)				XCT	XC (TruFlex + CL applied)		XCT	CL (CL Chemistry applied)			XCT	CT (CL + TT Chemistry applied)			XCT	TT (TT + Selective applied)			XCT	
ROWS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	

Locations, Trial Design, Assessments & Treatments

Trial locations in 2021 included; Tarlee SA, Yeelanna SA, Nabawa WA, Cunderdin WA, Mokine WA, Kojonup WA, Gibson WA, Lake Bolac Vic, Yarrowonga Vic, Wallendbeen NSW and Cowra NSW.

Each 3 replicate RCB separate herbicide technology section was sown to target 25-35 plants per m2 established and has the appropriate registered chemistry applied at standard timings/rates, with stacked variety blocks also having both chemistries applied. Field assessments for all varieties include Plant establishment in m2, plant vigour scores, flowering maturity in days to 50% flower, windrowing maturity (3 to 6 scale), plant height (cm), grain yield (kg/ha) and grain oil%. Each site is managed to the highest professional standards in the Industry and high integrity around agronomy and trial management where standards are designed specific to the trial environments.

HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



CROSS-TECHNOLOGY MET ANALYSIS BENEFITS FOR GROWERS OVER SINGLE SITE ANALYSIS

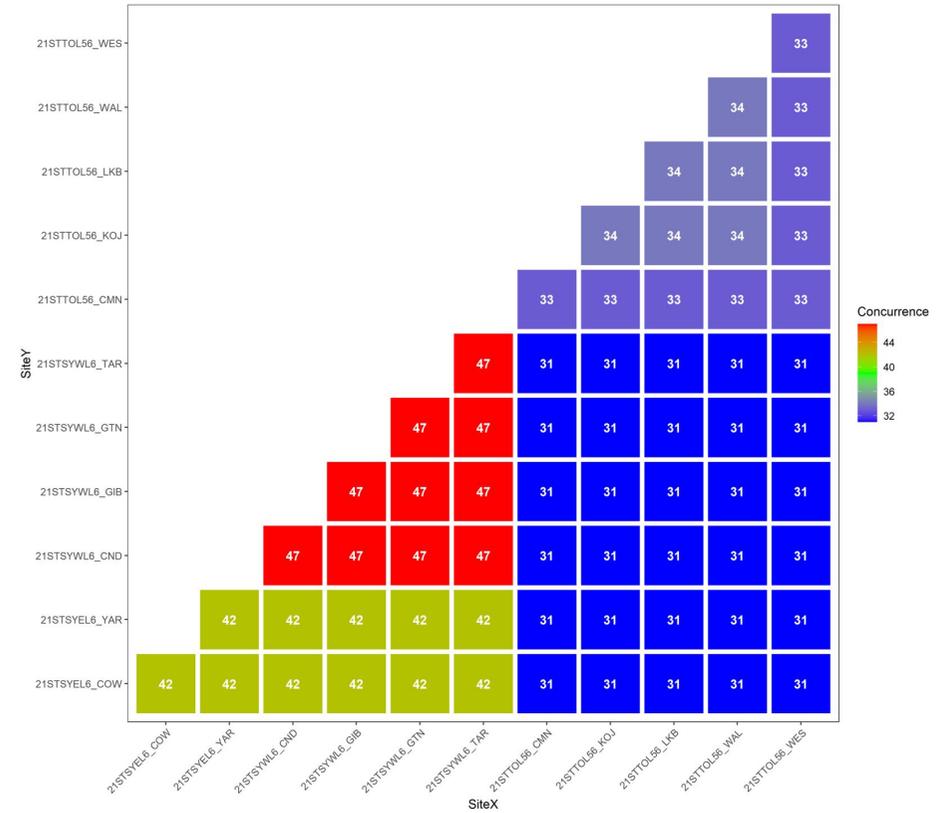
MET Analysis Benefits over Single Site Analysis

Multi Environment Trial (MET) analysis is the currently the most powerful tool to compare the adaptability of varieties across a range of environments and seasons using all the available data.

MET analysis results provide increased reliability and accuracy from a bigger dataset than a Single Site Analysis. The 2021 MET analysis was conducted on a one-year dataset that includes 11 trials from a range of environmental conditions. In 2022, the expansion of the Hyola Innovation Systems Technology trials to 20 environmental sites will provide for a 2-year combined MET analysis with results data from 2021 and 2022 replicated trial sites.

This enables advisors and growers to select consistently high performing varieties now across all major herbicide technologies including stacked hybrids.

Use of Single site location results can be inaccurate and quite misleading for longer term varietal adaptability decisions. Single sites only show "One Trial, One season, One location, Once off" result and it is imperative that when used as part of the decision making process, that the individual site statistics (CV, LSD values) are reviewed accurately when interpreting the data for performance relating to specific varieties.



Pacific Seeds 2021 Hyola® Innovation Systems Technology Trials across 11 environments showed high levels of varietal concurrence.

HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 MET ANALYSIS GRAIN YIELD COMPARISON OUTCOMES FOR AUSTRALIAN GROWERS

CANOLA

MET Analysis Variety Results Outcomes

|| Cross-Technology trial sites with data shown is grain yield BLUP (t/ha) above or below the mean yield of the trial.

Green colours are strongest positive results above mean, with the Red colour being below the mean. Any variety that shows green across more environments is more adaptable and higher yielding.

Clusters 1 & 2 are MEGA environments determined by the genetic correlation between sites as determined by the MET analysis.

Single sites only demonstrate the relative ranking of varieties for one trial, DO NOT focus on one Single environment result.

The 2021 higher rainfall season strongly influenced varietal performance ranking comparisons, and best to always compare across multiple seasons and environments.

These yield results clearly demonstrate that genetically higher yielding TT hybrids can yield as well as CL, TruFlex®, XC and RR hybrids.

Variety Technology Entry	Overall TGV_Yield_Cluster_1	TGV_Yield_21STSYVL6_COW	TGV_Yield_21STSYVL6_YAR	TGV_Yield_21STSYVL6_GIB	TGV_Yield_21STSYVL6_GTN	TGV_Yield_21STTOL56_WAL	TGV_Yield_21STTOL56_WES	TGV_Yield_21STSYVL6_TAR	Overall TGV_Yield_Cluster_2	TGV_Yield_21STSYVL6_CND	TGV_Yield_21STTOL56_CMN	TGV_Yield_21STTOL56_KOI	TGV_Yield_21STTOL56_LKB
Hyola Regiment XC	0.476	0.483	0.718	0.365	0.238	0.758	0.223	0.554	0.485	0.486	0.647	0.194	0.322
Hyola Solstice CL	0.509	0.463	0.667	0.365	0.322	0.803	0.251	0.648	0.414	0.462	0.592	0.119	0.188
Pioneer 44Y94	0.347	0.370	0.321	0.318	0.343	0.576	0.146	0.381	0.485	0.506	0.494	0.242	0.455
Pioneer 45Y93	0.386	0.397	0.495	0.370	0.371	0.686	0.119	0.273	0.278	0.248	0.244	0.242	0.343
Nuseed Condor TF	0.315	0.311	0.140	0.289	0.414	0.521	0.139	0.387	0.452	0.513	0.430	0.204	0.414
Hyola Blazer TT	0.331	0.358	0.477	0.298	0.233	0.561	0.124	0.292	0.340	0.314	0.372	0.210	0.334
Pioneer 45Y28	0.279	0.291	0.291	0.240	0.238	0.453	0.125	0.326	0.371	0.390	0.409	0.167	0.315
Nuseed GT53	0.309	0.287	0.314	0.266	0.317	0.524	0.120	0.310	0.231	0.252	0.239	0.133	0.202
HyTTec Trifecta	0.219	0.231	0.215	0.218	0.250	0.387	0.070	0.172	0.223	0.219	0.187	0.162	0.264
Pioneer 44Y90	0.195	0.183	0.095	0.183	0.275	0.335	0.075	0.207	0.206	0.238	0.174	0.114	0.207
Pioneer 43Y29	0.153	0.162	0.145	0.128	0.126	0.241	0.077	0.204	0.244	0.262	0.276	0.094	0.195
Hyola Equinox CL	0.167	0.159	0.287	0.076	-0.022	0.216	0.122	0.321	0.244	0.273	0.410	0.004	0.050
Pioneer 44Y27	0.165	0.150	0.153	0.110	0.116	0.243	0.097	0.268	0.219	0.258	0.291	0.041	0.107
Hyola Garrison XC	0.146	0.124	0.257	0.051	-0.032	0.182	0.114	0.303	0.174	0.209	0.340	-0.034	-0.027
InVigor R 4022P	0.118	0.142	0.196	0.111	0.059	0.198	0.044	0.098	0.162	0.142	0.178	0.098	0.166
Nuseed Raptor TF	0.048	0.096	0.024	0.053	0.013	0.059	0.038	0.103	0.299	0.302	0.320	0.115	0.275
Hyola Battalion XC	0.155	0.125	0.286	0.072	0.004	0.219	0.097	0.249	0.082	0.102	0.213	-0.033	-0.069
InVigor R 4520P	-0.003	-0.035	-0.159	-0.032	0.053	-0.037	0.032	0.123	0.069	0.134	0.097	-0.052	-0.026
SF Dynatron TT	0.032	0.023	0.055	0.032	0.041	0.067	0.000	-0.007	-0.050	-0.059	-0.066	0.004	-0.026
HyTTec Trident	-0.065	-0.020	-0.094	-0.025	-0.048	-0.104	-0.032	-0.086	0.099	0.080	0.063	0.066	0.154
Hyola 410XX	-0.086	-0.093	-0.114	-0.139	-0.188	-0.216	0.030	0.110	0.095	0.145	0.225	-0.106	-0.084
Hyola Enforcer CT	-0.104	-0.053	0.122	-0.124	-0.339	-0.218	-0.012	-0.054	0.045	0.000	0.170	-0.038	-0.035
HyTTec Trophy	-0.108	-0.100	-0.164	-0.081	-0.063	-0.176	-0.047	-0.115	-0.061	-0.062	-0.093	-0.027	-0.029
Hyola 540XC	-0.197	-0.145	-0.080	-0.185	-0.339	-0.363	-0.057	-0.159	-0.012	-0.048	0.056	-0.054	-0.045
InVigor T4510	-0.169	-0.178	-0.258	-0.139	-0.092	-0.276	-0.073	-0.177	-0.176	-0.169	-0.220	-0.086	-0.140
Hyola 404RR	-0.432	-0.435	-0.382	-0.429	-0.535	-0.770	-0.135	-0.338	-0.383	-0.387	-0.296	-0.294	-0.467
ATR Bonito	-0.692	-0.705	-0.726	-0.612	-0.647	-1.155	-0.284	-0.728	-0.777	-0.808	-0.817	-0.402	-0.705
Mean Yield		3.337	3.132	3.741	3.358	3.927	3.236	2.949		2.313	2.254	0.995	2.413

HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS

2021 MET ANALYSIS GRAIN YIELD COMPARISON OUTCOMES FOR AUSTRALIAN GROWERS



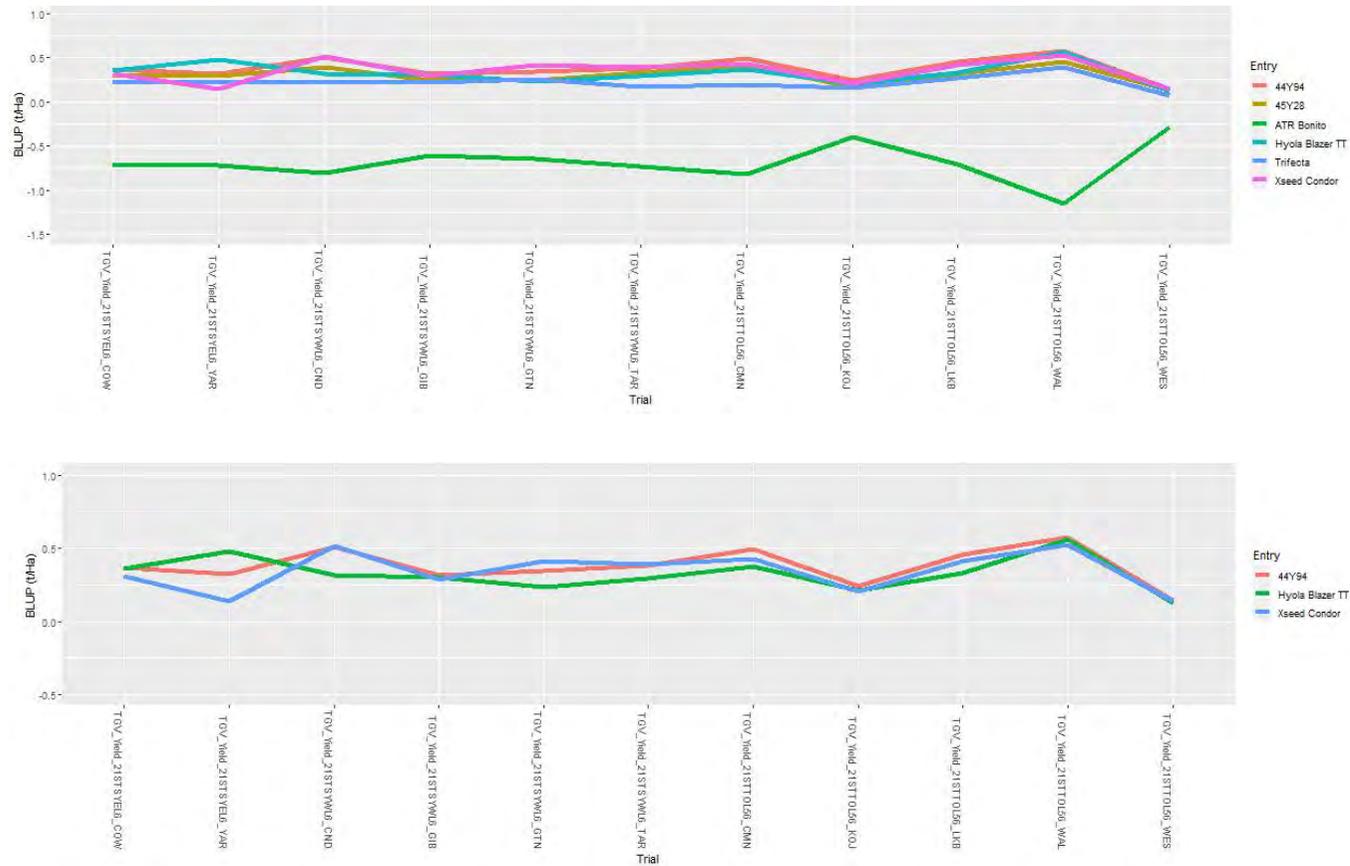
MET Analysis - PV Plus Methodology Outcomes

Comparative data showing CL, RR, TT, TruFlex® hybrids vs an OP TT across 11 sites.

Top graphic shows Hyola Blazer TT and HyTTec Trifecta TT are showing competitive performance at most sites against CL and GLY based technologies.

All hybrid technologies represented by specific varieties showing 1.0t to 1.5t/ha higher yields than an OP TT in a higher rainfall season.

Bottom graphic shows CL vs TT vs TruFlex® hybrid comparison, demonstrating that higher yielding TT hybrid genetics can yield similarly to Clearfield® and TruFlex® hybrids at some locations.



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS

2021 MET ANALYSIS GRAIN YIELD COMPARISON OUTCOMES FOR AUSTRALIAN GROWERS

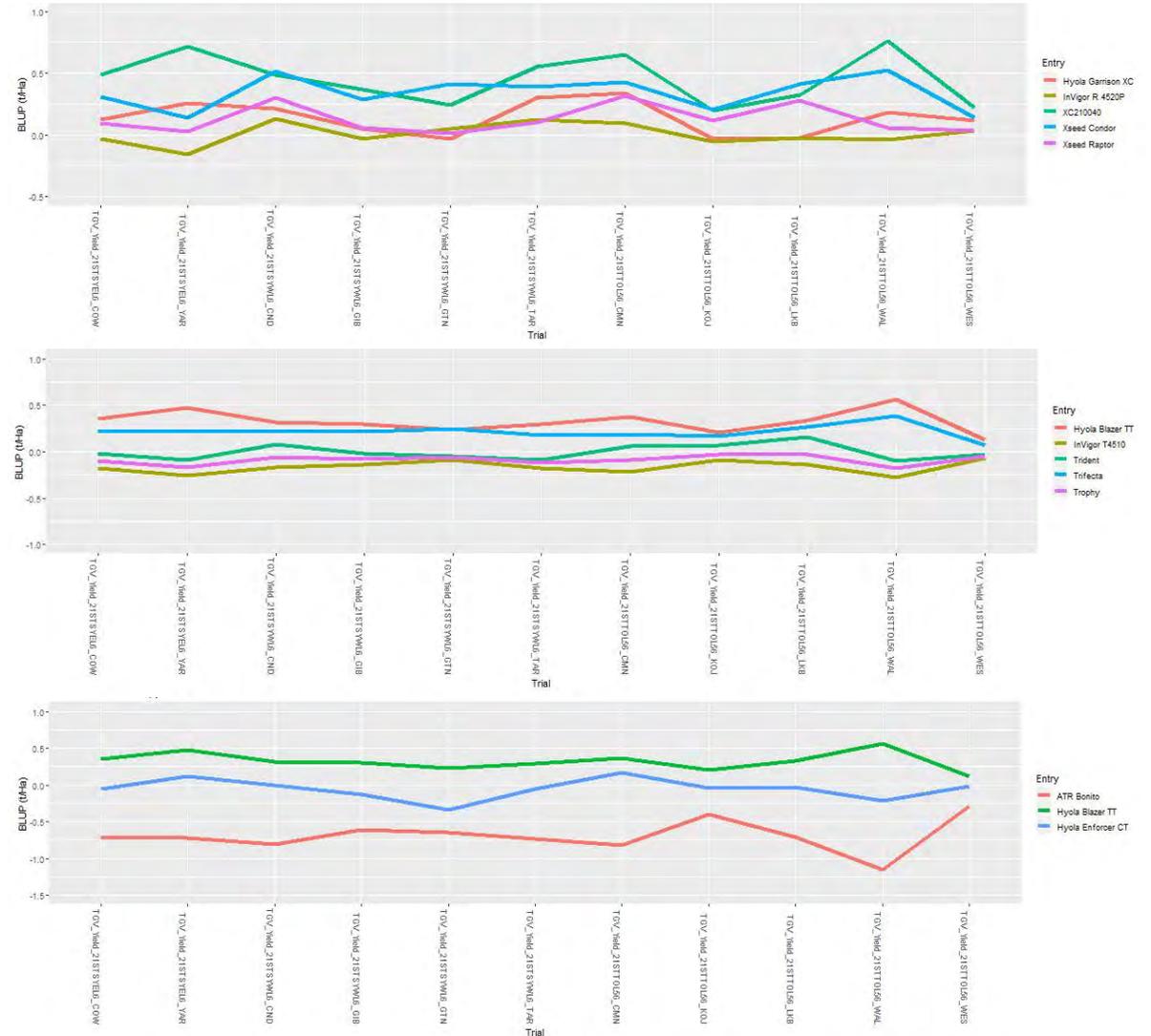


MET Analysis - PV Plus Methodology Outcomes

Top graphic shows higher rainfall season favoured the mid season types, with new XC stacked genetics showing comparative or better performance to Single trait TruFlex® technology.

Middle graphic shows both Hyola Blazer TT and HyTTec Trifecta TT showing the higher yields across environments in a higher rainfall season when compared to other TT hybrids.

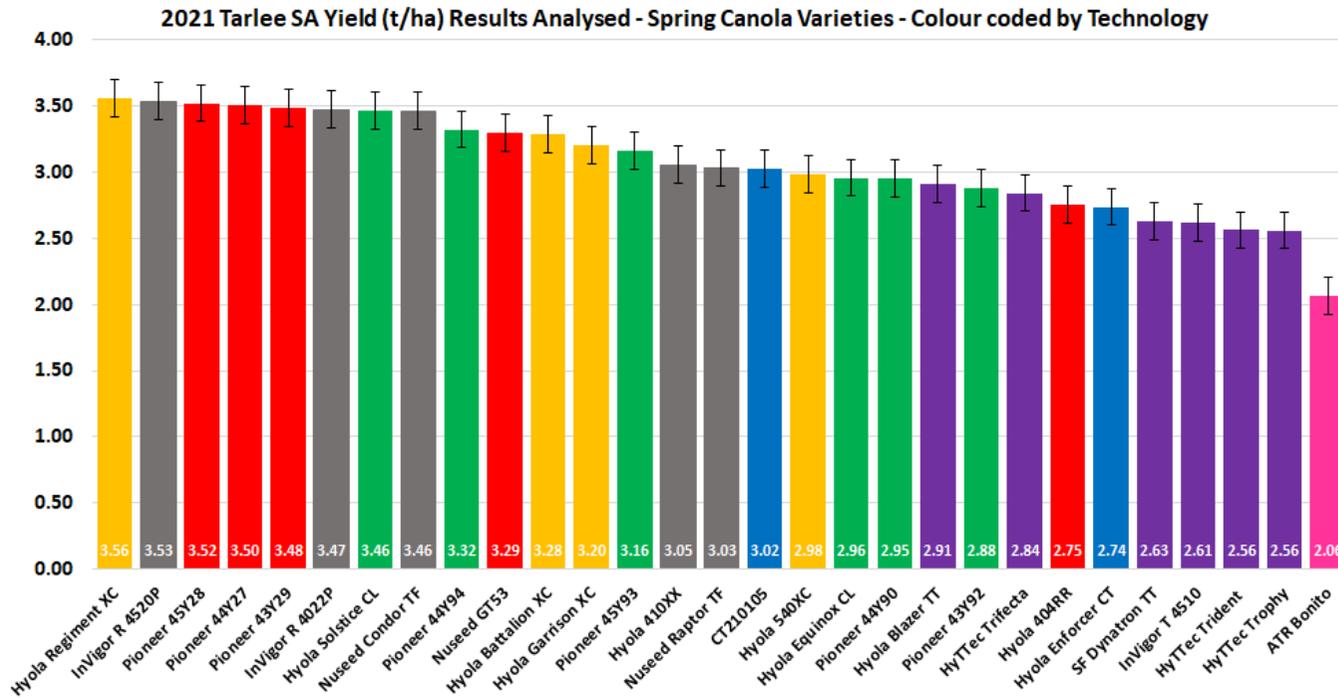
Bottom graphic shows both Hyola Blazer TT and Hyola Enforcer CT showing the higher yields across environments in a higher rainfall season when compared to industry standard OP TT variety, ATR Bonito.



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 5.957
LSD: 0.278
Mean: 2.897

Use statistics to determine if any significant yield differences at Single sites

Technology Key

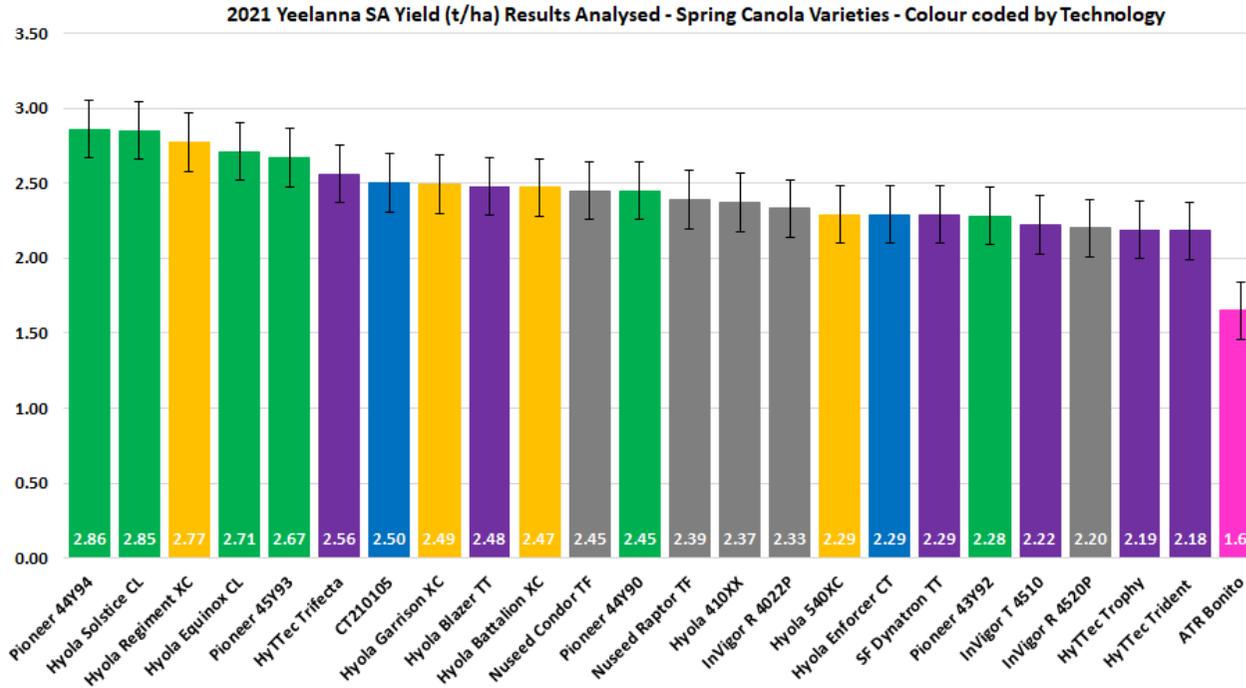
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 10.378
LSD: 0.387
Mean: 2.321

Use statistics to determine if any significant yield differences at Single sites

Technology Key

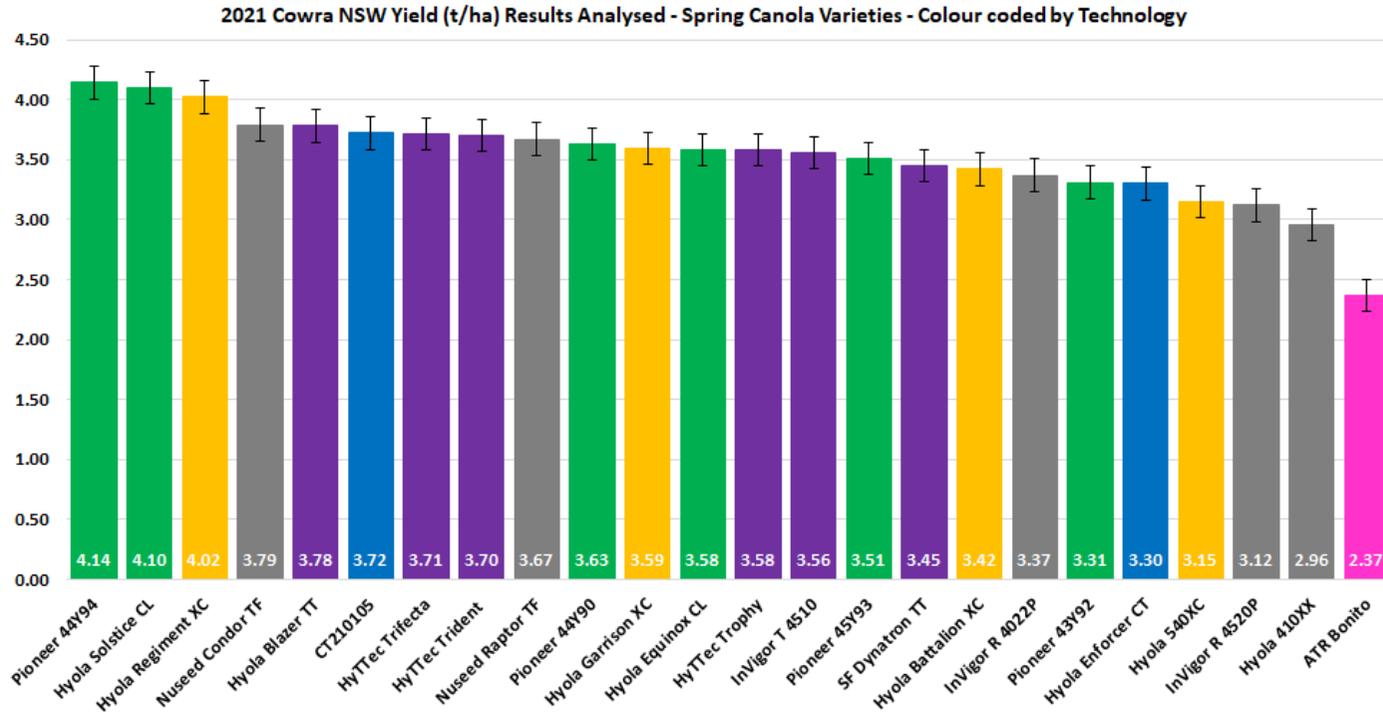
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 4.970
LSD: 0.269
Mean: 3.356

Use statistics to determine if any significant yield differences at Single sites

Technology Key

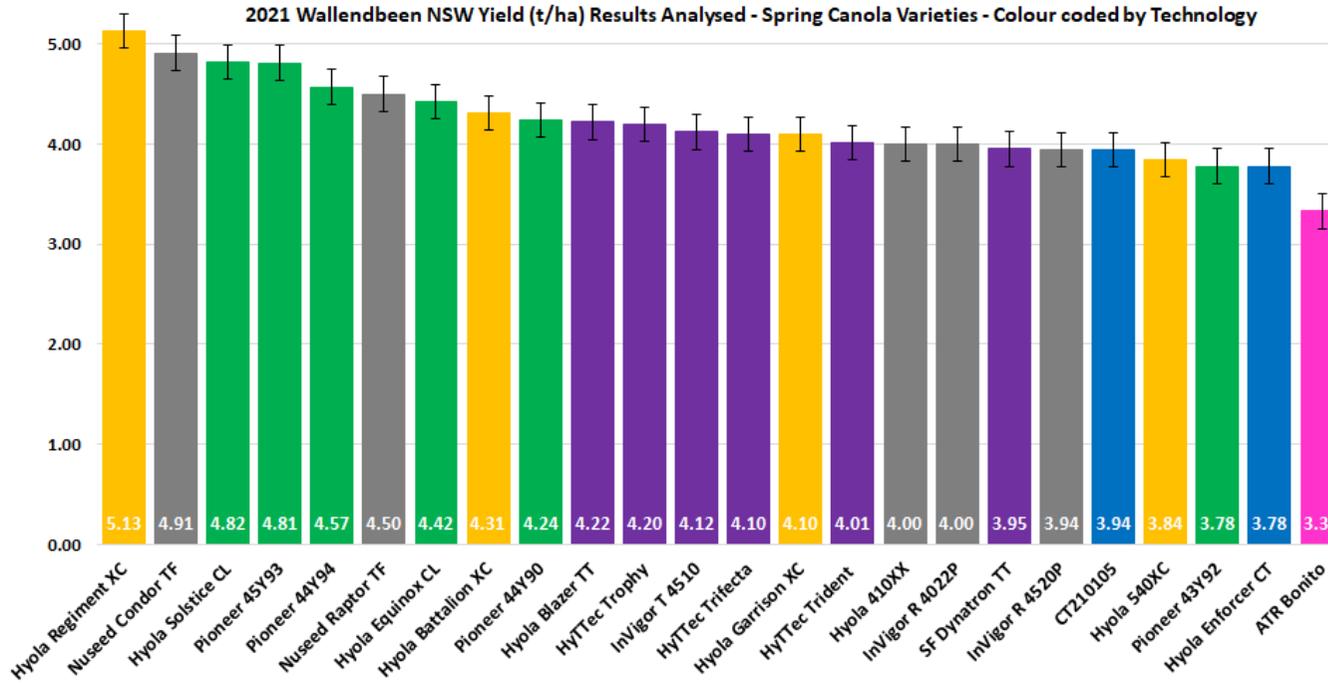
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 6.875
LSD: 0.343
Mean: 4.009

Use statistics to determine if any significant yield differences at Single sites

Technology Key

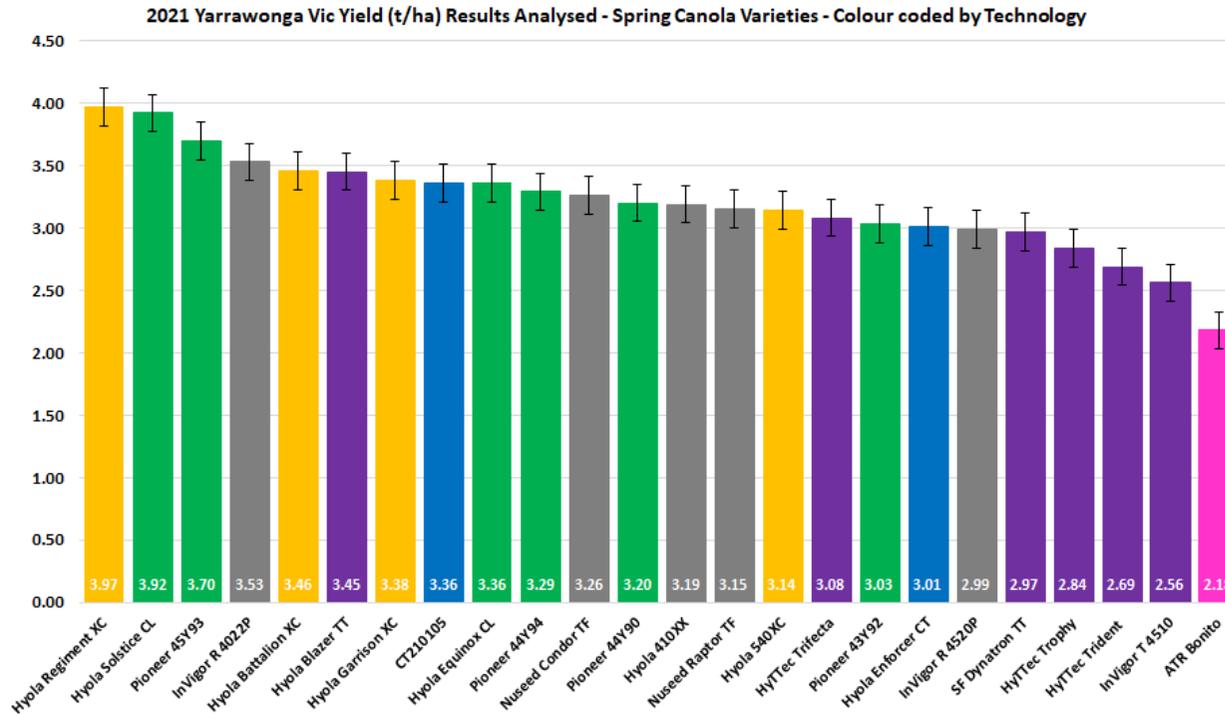
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 7.997
LSD: 0.303
Mean: 3.128

Use statistics to determine if any significant yield differences at Single sites

Technology Key

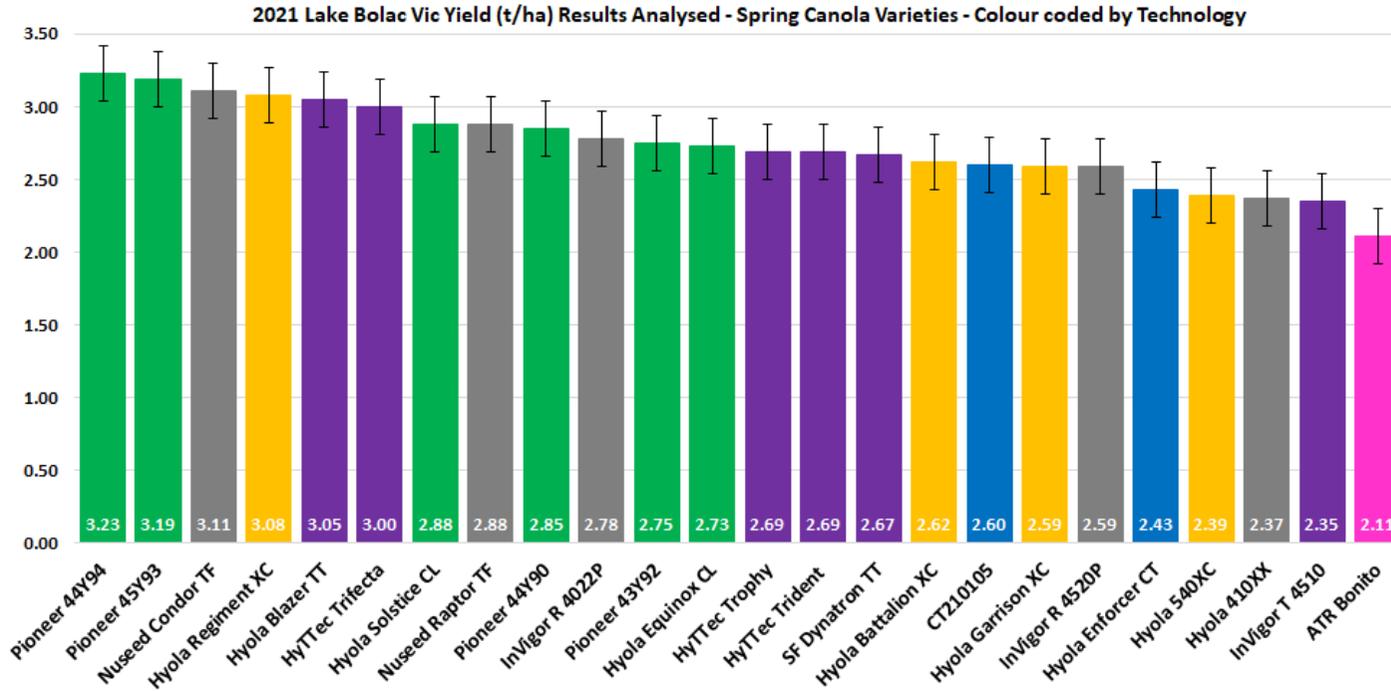
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 12.360
LSD: 0.385
Mean: 2.440

Use statistics to determine if any significant yield differences at Single sites

Technology Key

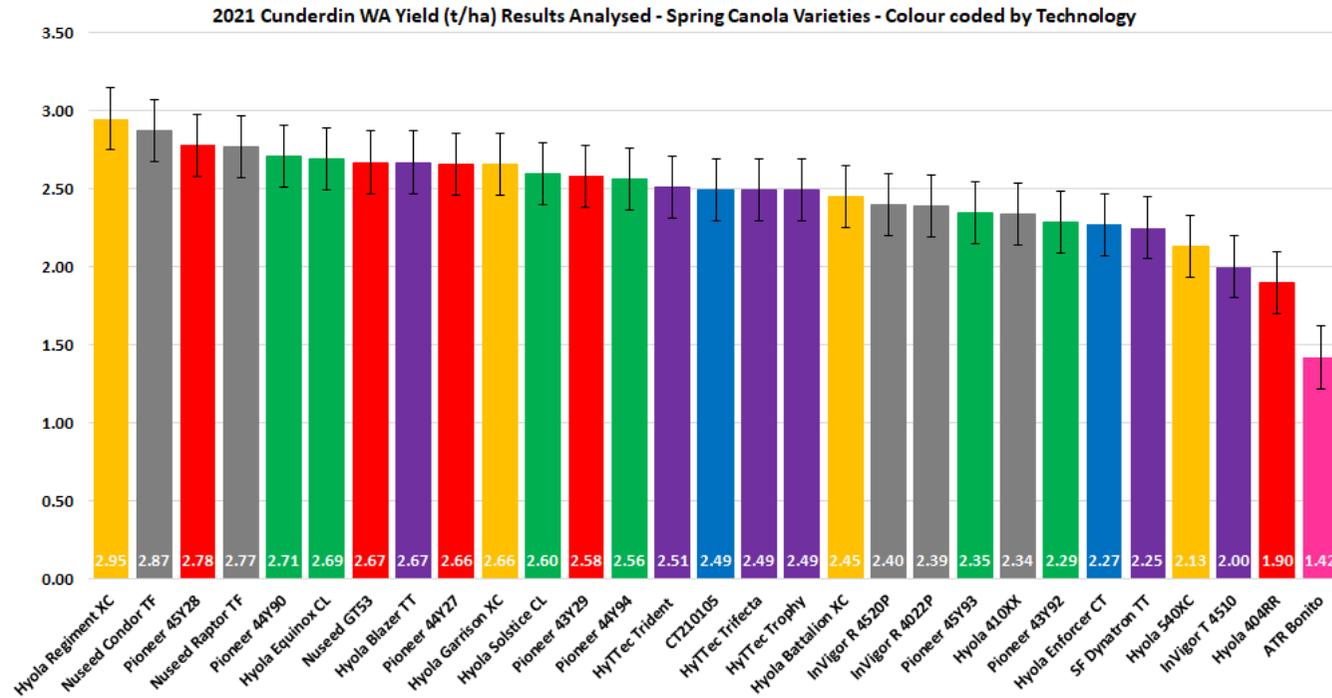
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 13.124
LSD: 0.398
Mean: 2.357

Use statistics to determine if any significant yield differences at Single sites

Technology Key

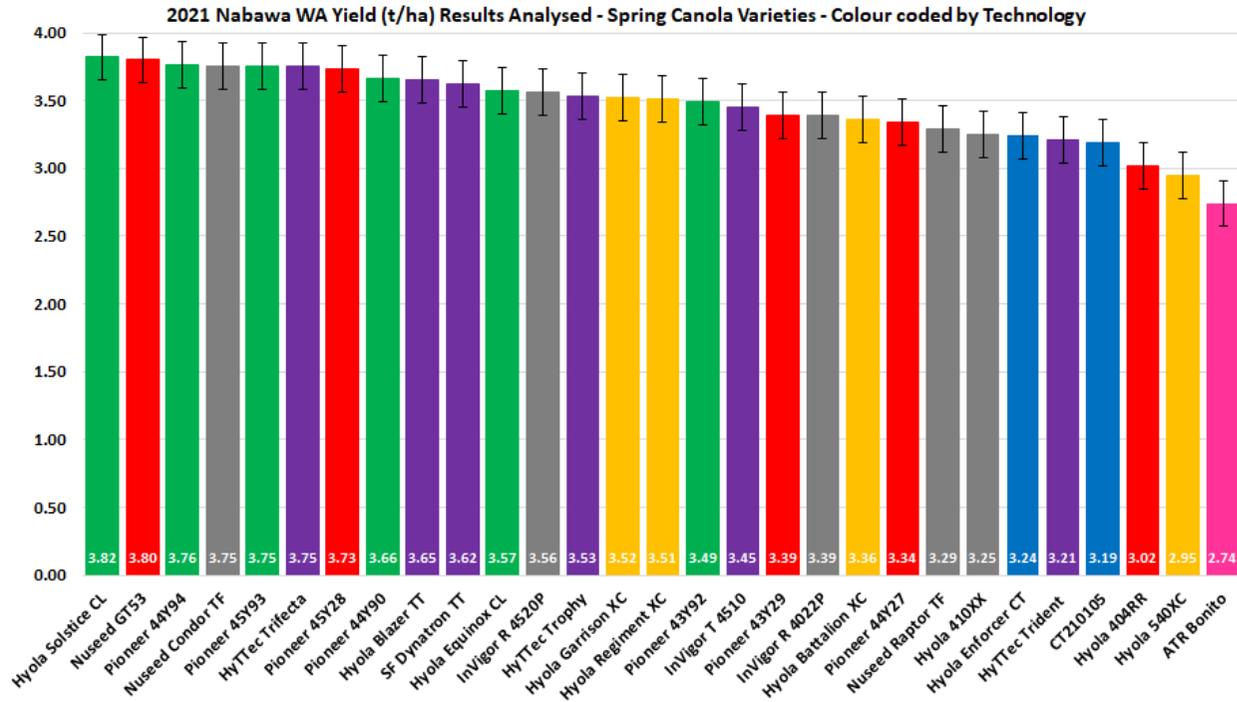
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS

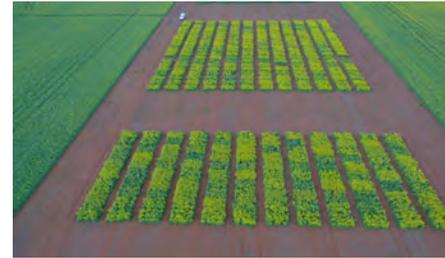


CV: 8.017
LSD: 0.340
Mean: 3.404

Use statistics to determine if any significant yield differences at Single sites

Technology Key

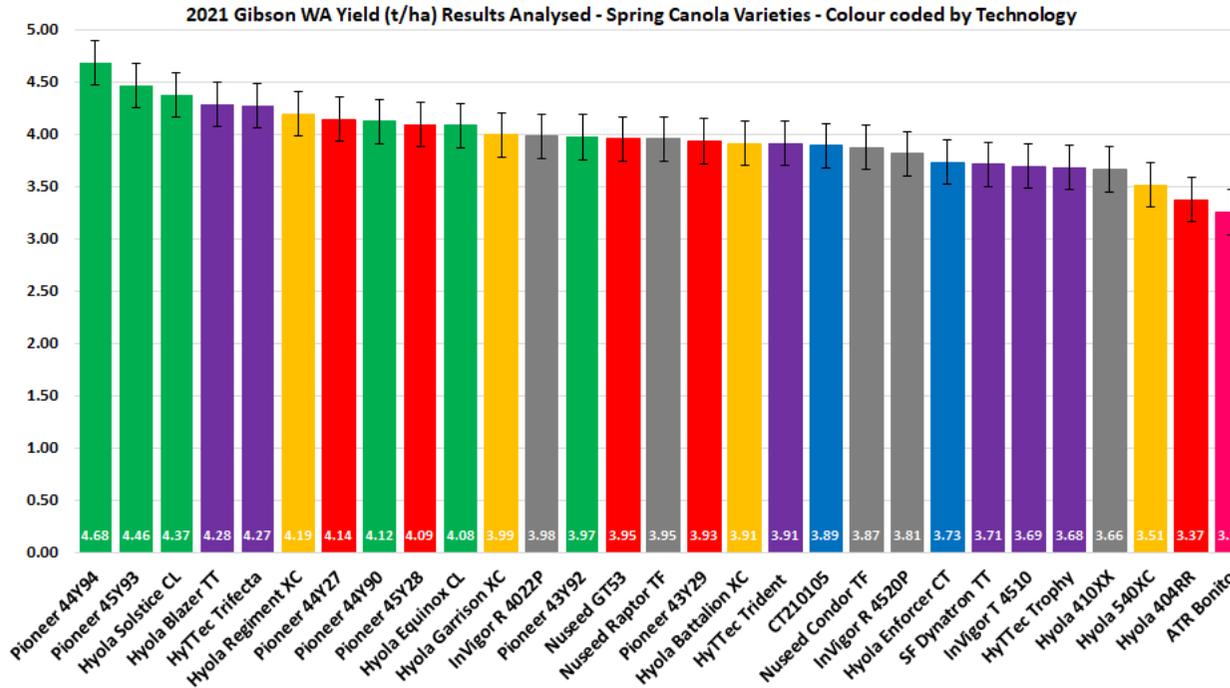
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 6.86
LSD: 0.426
Mean: 3.848

Use statistics to determine if any significant yield differences at Single sites

Technology Key

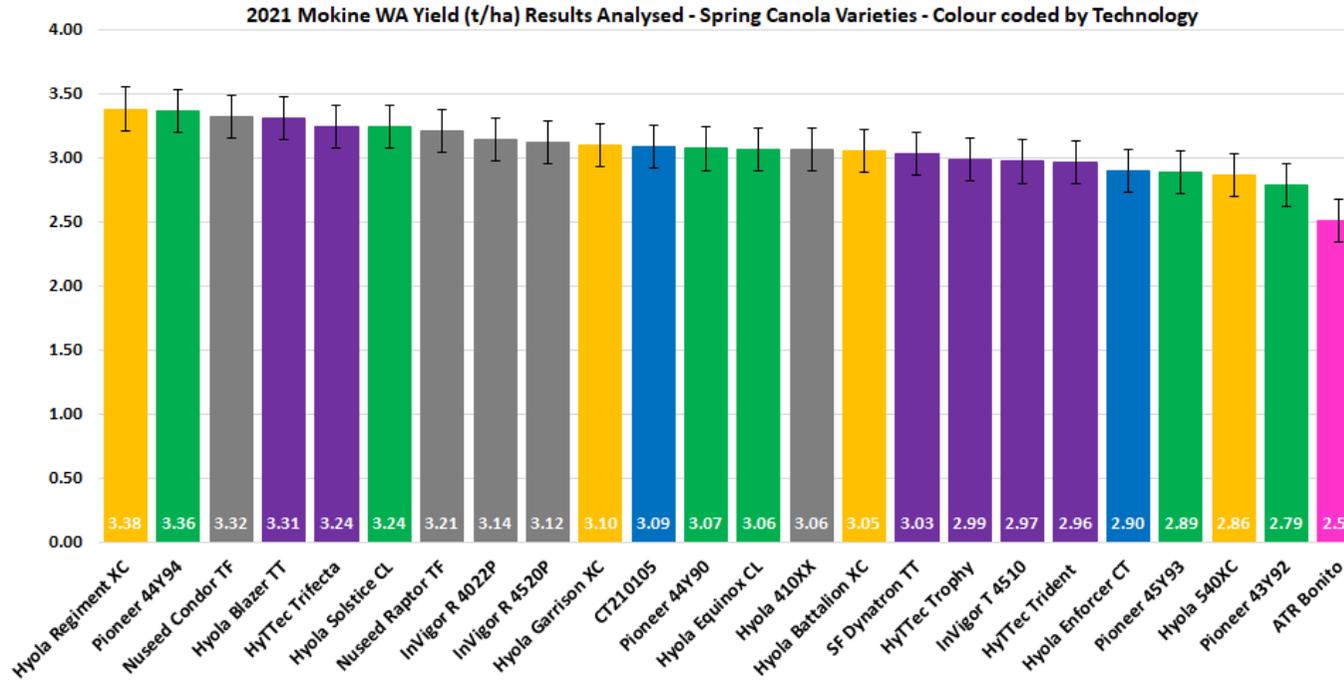
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS

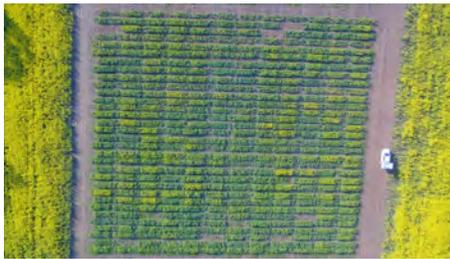


CV: 13.279
LSD: 0.336
Mean: 3.011

Use statistics to determine if any significant yield differences at Single sites

Technology Key

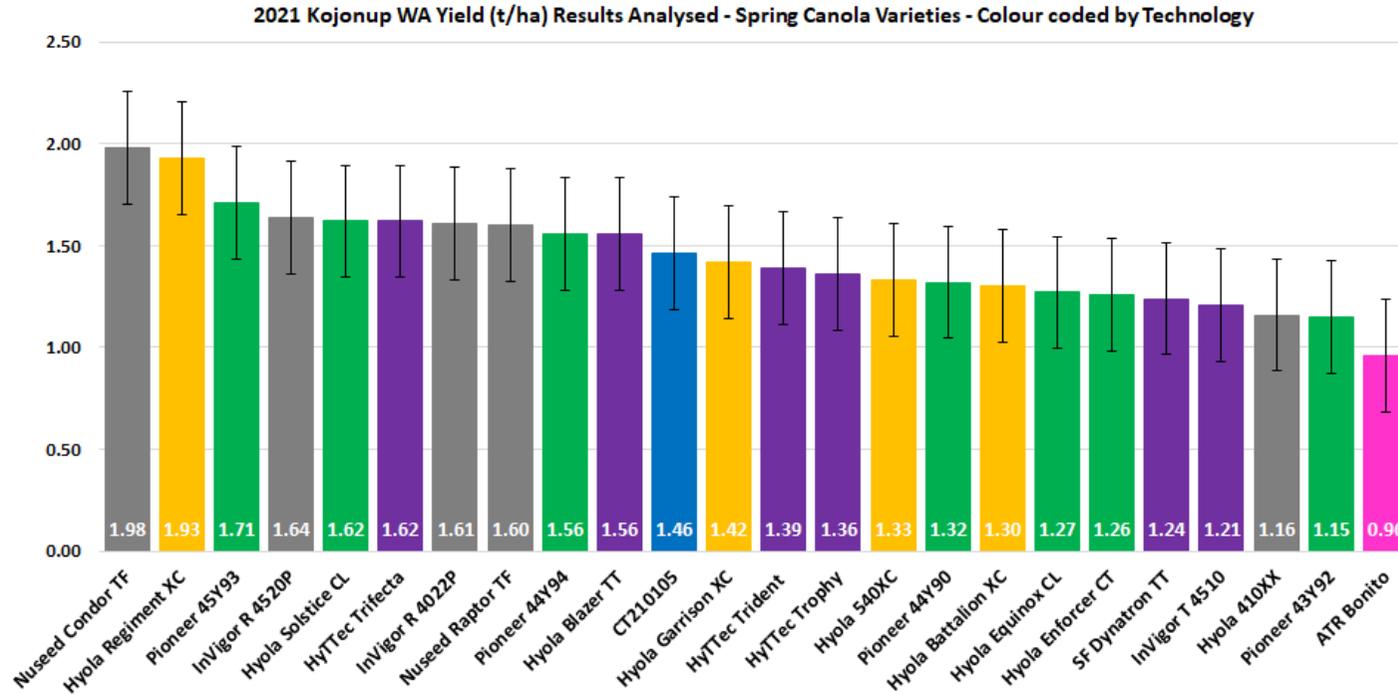
- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



HYOLA INNOVATION SYSTEMS TECHNOLOGY TRIAL RESULTS



2021 SINGLE SITE YIELD RESULTS - INTERPRET WITH CAUTION AND USE THE STATISTICS



CV: 20.515
LSD: 0.552
Mean: 1.363

Use statistics to determine if any significant yield differences at Single sites

Technology Key

- TruFlex + Clearfield Hybrid
- TruFlex Hybrid
- Roundup Ready Hybrid
- Clearfield Hybrid
- Clearfield + Triazine Hybrid
- Triazine Hybrid
- OP TT



Comments: Trial site waterlogged with variable low plant establishment led to significantly lower yields, High CV, High LSD and these results should be interpreted with extreme caution.